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A phenomenological exploration of clinical decision making of Intensive Care Unit (ICU) nurses in relation to sedation management

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Declaration

I here in declare that this thesis has been composed by me and that the research on which it reports is my own work.

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October 2012

“It may seem a strange principle to enunciate, as the very first requirement in a hospital, that it should do the sick no harm”

- Florence Nightingale.

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Abstract

Driven by research studies and national targets, sedation practices in Intensive care Units (ICU) are undergoing change. Traditionally, ventilated patients in ICUs were kept deeply sedated and only gradually 'weaned off' sedation. However, current evidence supports a more 'wakeful' patient with the introduction of 'sedation holds' encouraging them to regain consciousness (Kress et al. 2000). There is little research exploring ICU nurses' assessment and management of sedation. Employing a Heideggerian, hermeneutic phenomenological approach to enquiry, the study sought to provide insights into the world of the critical care nurse, nursing with technology, and specifically their beliefs surrounding sedation practices and how organisational factors, knowledge and personal experiences influence their clinical decisions in the care of the ventilated patient.

The setting was the Royal Infirmary of Edinburgh, ICU and the purposive sample consisted of 16 ICU nurses with diverse critical care nursing experience. Bedside interviews, utilising an aide memoir, elicited narratives about the nurses' experiences of sedation practice and a novel sedation monitor (responsiveness). The phenomenological analysis drew upon a number of existing frameworks to guide enquiry. The researcher engaged with the 'hermeneutic circle', acknowledging her pre-understandings and using these as a platform to move between the whole of the research and the parts, the descriptions and narratives offered, to develop new knowledge. Themes emerged that demonstrated patients' sedation status directly impacted upon the nurses' ICU lived experiences and left them in a state of disequilibrium regarding the requirement to deliver research based care, the desire to deliver holistic care and the duty to deliver safe care. The nurses perceived sedation holds and 'wakefulness' as resulting in patient agitation and distress which affected patient safety and comfort. However, the nurses equally felt a pressure of obligation to the doctors to perform such evidence based sedation holds. They described the struggling to maintain patient safety and manage their own fears and anxieties and organisational constraints, whilst experiencing guilt, blame and failure associated with their behavioural discordance with the prescribed decisions and their own clinical decision making processes and strategies. Team work between the two

professions and effective leadership is evidently less than ideal. Consequently the implementation of changes in sedation practice is failing to meet either the national targets or to respond to the nurses' concerns regarding their patient's short term wellbeing. On both counts this potentially impairs the pursuit of best practice.

List of Tables and Figures

Chapter 1: Introduction

1.1 Background to this study

1.1.2 The researcher's personal and professional interests

The researcher's initial interest in this area began when she was an inexperienced nurse, feeling overwhelmed by the 'new-ness' of the Intensive Care Unit (ICU) environment but particularly the domination of ICU technology. Consequently, for her Bachelor of Nursing (Honours) dissertation, the researcher undertook a small research study which explored the differences in inexperienced and expert nurses' management of ICU technology in their patient care. This work generated her interest in research and specifically ICU research and strongly influenced her decision to pursue a research career pathway. The researcher wishes to note that some ideas for this doctoral work evolved from this earlier academic work. By sheer good fortune, the researcher's role as a research coordinator involved working closely with ICU nurses and research developing a new ICU sedation technology. Notably, research work into the implications of technology and the sedation changes in ICU practice were being approached using a very quantitative approach. Over time there developed a recognised need for qualitative insights in addition to the quantitative approach and following many discussions the ideas were developed into a research proposal which engaged the researcher, complemented her previous areas of interested and continued to build upon her close working relationship with the ICU nurses and setting.

1.1.3 The current research evidence and ICU practices

Sedation practices in ICUs worldwide are undergoing significant changes. Sedation is used to keep the ICU patient comfortable and to facilitate care and therapeutic interventions that may be required during their period of critical illness, particularly mechanical ventilation. Traditionally it was deemed best practice that patients in ICU received large volumes of sedation and that any degree of patient awareness would result in detrimental outcomes for ICU patients. However, in more recent years, a more 'wakeful' ICU population is being encouraged as increasingly robust evidence suggests that there are positive physical and psychological effects for

patients who are managed with smaller doses of sedation (Girard et al. 2008;Kress et al. 2000). Achieving a more wakeful population has been aided via the optimisation of sedation as part of a national patient safety programme in Scottish ICUs to reduce ventilator associated pneumonia (VAP). The Scottish Patient Safety Programme (SPSP) has been rolled out nationally across Scottish healthcare organisations (NHS Quality Improvement Scotland 2009). The programme has been adopted and adapted from an international safety initiative developed by the Institute for Healthcare Improvement (IHI) based in the United States. The critical care work stream of the SPSP is specifically aimed at improving critical care outcomes, such as reducing mortality, or morbidity associated with infections and other adverse events. It intends to, and is successfully, achieving this using a combination of evidence-based tools and techniques to improve the reliability and safety of everyday health care systems and processes. The programme has introduced 'bundles' of care into practice. A 'bundle' is a structured way of improving the processes of care and patient outcomes consisting of a clear set of practices that, when performed collectively and reliably, should improve patient outcomes. The 'bundle' that this thesis pays particular interest to is the ventilator associated pneumonia (VAP) 'bundle', it contains a number of different elements proven, when all used together, to reduce the incidence of VAP in ICU. The SPSP VAP bundle elements can be found in Box 1. There are differences between the SPSP VAP bundle and the original IHI VAP bundle; the addition being the use of subglottic drainage to the SPSP bundle, which replaces the delivery of peptic ulcer and deep vein prophylaxis proposed by the IHI bundle.

- Sedation to be reviewed and, if appropriate, stopped each day
- All patients will be assessed for weaning and extubation each day
- Avoid supine position, aiming to have the patient at least 30° head up
- Use Chlorhexidine as part of daily mouth care
- Use subglottic secretion drainage in patients likely to be ventilated for more than 48 hours

Box 1: Scottish Intensive Care Society Audit Group (SICSAG) VAP prevention bundle elements (Beard et al. 2008)

As part of this the 'bundle' suggests, that unless light sedation levels are contraindicated, a daily sedation hold occurs (bullet point 1, Box 1). It is this element that is failing to meet the 95% compliance targets indicated by the programme.

A sedation hold is when a patient's sedation is simply switched off each day to facilitate an awake or rousable patient. Research evidence has revealed that a sedation hold as part of their daily care can assist in lowering the total volumes of sedation medication patients receive, reduce the need for mechanical ventilation, which in itself leads to reduced rates of VAP and thereby reduce patients' length of stay in ICU and, indeed, possibly decrease their overall time in hospital. The first step of reducing sedation also significantly avoids the problem of accumulating levels of sedatives which results in prolonged periods of unconsciousness and distorted memories of ICU, which is now being proven to be detrimental to a patients psychological recovery (Jones et al. 2001;Jones et al. 2004;Jones et al. 2007;Kress et al. 2003).

Despite the research based evidence surrounding the benefits of sedation holds they have not been implemented as readily as anticipated. In the overall aim of reducing VAP, there was 85% non compliance for the component relating to sedation holds in the researcher's ICU. ICU nursing staff are the healthcare workers who spend more time with patients than any other, and are well placed to implement the change.

However, very little evidence is currently available about their decisions surrounding sedation assessment and management and even less about their thoughts and feelings regarding sedation holds. Ultimately a more wakeful ICU population must have critical implications for the nurses' daily practice and their 'world' of care.

It is recognised that current sedation assessment, despite high inter-rater reliability of some clinical sedation scales, is open to subjectivity (Rowe & Fletcher 2008), whereas most other ICU physiological monitoring delivers information objectively through various technologies. Technologies are used to monitor patients' closely in response to interventions and medications are commonplace, yet no such monitoring exists to monitor patients' conscious level despite the reality that virtually all patients receive sedation during their ICU admission. Bearing this is mind, a novel monitor has been developed by GE Healthcare which delivers a continuous objective trend of the 'responsiveness' level of the patient.

This study employed a phenomenological approach of enquiry which seeks to illustrate the different human experiences as they are *lived* by different individuals. The full exploration of phenomenological enquiry can be found in Chapter 6. This doctoral study sought to elicit the nurse's feelings about ICU technologies and the current and changing sedation practices in their ICU 'world' and to explore the nurses 'lived experience' of ICU. Such an exploration allowed a picture to be built up of a 'world' which could militate against the successful implementation of the new practice of sedation holds necessarily embraced the examination of the ICU nurse's clinical decision making skills and outcomes and helped determine the role of the new responsiveness monitor in the nurses' sedation practices. The researcher fully appreciates the personal nature of phenomenological philosophy and therefore wishes to justify her writing approach at the outset. Although it may seem that adopting a 'third person' style runs counter to the deeply personal phenomenology philosophy, the researcher felt that the adoption of the first person style and approach detracted from the nurses 'lived experiences'. Despite the researcher undoubtedly being immersed in the data gathered and offering her own interpretations, reflexivity and understanding for the reader to consider, it was felt that rather than the strong presence of the first person style of writing, a more 'abstract' third person sat more

comfortably with the desire to emphasise the nurses voices and accentuate their 'world'.

This research study has enabled a greater understanding of the decision making processes of nurses within the arena of critical care sedation, specifically in the novel area of sedation holds. It has also offered insights into nurses' feelings and thought processes, their reasoned response patterns of agreement and disagreement and their views of and reactions to a new responsiveness technology. Such insights offer a focus of examination of current sedation management, the effectiveness of technological interventions in ICU, and ultimately patient outcomes.

1.2 Deficits in knowledge and awareness in this field

There is very little research evidence that specifically explores nurses' clinical decision making in relation to sedation assessment and management. The management of ICU patients' sedation is normally a nurse-led activity and encompasses a number of different factors. However, there is equally little evidence available specifically looking at nurses' experiences and feelings surrounding sedation management, specifically the sedation holds. Considering that sedation management directly impacts upon an ICU patients' care and can have implications for patient care/outcomes if managed poorly, this is an area that requires examination.

The responsiveness monitor is a new tool. No such tools for monitoring conscious level in ICU patients previously existed. In light of the latter, it is important that the nurses' thoughts, feelings and opinions are sought as to how they integrate this technology into their daily practice. Involving the frontline users of technology in its development is of paramount importance. McConnell (1990) argues that many nurses believe that technology introduced in ICU is often just designed 'for the market' without any real thought about the main users in practice. Technologies are being developed to provide *more* information about patients' clinical status but overlooking the practicalities of its use in 'real' healthcare settings *or* the implications of its use for patients and staff. This is despite the appreciation that the success of a piece of technology ultimately depends upon its users and the impact it has on their day-to-day practice (Pope 1974).

1.3 What this study adds to the available sedation research

There is considerable literature concerning both nurses' clinical decision making and sedation as separate entities but very little that specifically looks at clinical decision making and sedation management in intensive care, specifically the role of sedation holds. The responsiveness monitor is new and is only currently being subjected to rigorous research inquiry. This study has looked to provide insights into sedation practices amongst a diverse ICU nursing team, drawing out personal experiences, knowledge and behaviour patterns that influence the clinical decisions made and explore how the ICU environment impacts on the clinical decisions nurses make regarding their patients' sedation. This research has also give an indication of the acceptability, usability and integration of the responsiveness monitor into daily ICU nursing practice.

Chapter 2: Review of the literature

The following four chapters will review the literature pertinent to this research study. The researcher has chosen to use four different chapters as four distinct areas of nursing practice require to be reviewed to clearly set the scene. This chapter will review the 'world' of intensive care and development of knowledge in nursing practice. Chapter 3 reviews the literature around ICU technology and its relationship with the nursing profession. Chapter 4 then reviews the literature around sedation practice in ICU highlighting the practice changes that have been occurring in the last decade and the rationale for these. The final chapter reviews the clinical decision making literature, acknowledging the complexities of clinical decision making, the impact of context and nursing experience, and the potential implications in clinical practice.

A search of various databases was required to gather the vast literature available about nursing knowledge, technology, sedation and clinical decision making. The electronic databases MEDLINE, CINAHL, EMBASE, British Nursing Index, EBSCOhost, ScienceDirect and the BMJ journal collection were searched from 1946 to 2012. The Department of Health and Intensive Care Society publications were also searched. In addition a number of key articles were handpicked from reference lists in already sourced literature and a number of seminal social sciences, nursing research and German philosopher's publications were actively sought.

A number of key words were used to search the databases, most commonly intensive care, critical care, nursing knowledge, caring, intensive care/healthcare technology, medical devices, sedation, sedation assessment, sedation holds, optimal sedation, clinical decision making, experiential learning, novice and expert. Further refined searches were performed examining areas revealed during the literature review process and issues unveiled in the analysis requiring more in depth discussion and insight. The key words were combined used using Boolean logic and truncation characters.

The researcher excluded non-English literature unless a translated copy was available and acknowledges that a number of primary resources for some philosophers were difficult to obtain. The studies examined were of the adult critical care population

with one exception when the researcher was considering the guidelines surrounding sedation assessment and one set of paediatric guidelines are reviewed (see Appendix 5). The researcher included international studies, a necessity to illustrate the diversity in sedation practices particularly.

2.0 The nature of intensive care

2.1 Overview of chapter

This chapter is essentially setting the scene of what intensive care is and will review the literature around developing knowledge within nursing, drawing upon Carper's work (1978). There are different types of knowledge that nurses draw upon to make decisions regarding their patients' care that is integral to their nursing practice. The development of this knowledge is influenced by their clinical experience and hence the nurses' experience directly affects their clinical decision making, explored in Chapter 5. The relationship between clinical expertise and research based evidence is also explored.

2.2 When 'care' became intensive

Intensive care is still a relatively young specialty, arising at the time of the polio epidemic in the 1950s. The first official ICU was built in the United Kingdom in 1964 (Woodrow 2000). The terms intensive care and critical care are often used synonymously and the researcher wishes to clarify that they are, and should be, viewed as holding the same meaning; "areas in a hospital where patients at high risk of developing, or already suffering from, multiple organ dysfunction are managed and cared for" (ICNARC 2009). The development of such specialist areas have been a great advancement for healthcare and its recipients, as Rapin (1987) states, intensive care units can now "support failing vital functions almost indefinitely" (p301). This specialist care is costly, the average cost of each day of a patient's stay in an intensive care unit is in 1994 was £1100 (Cuthbertson & Webster 1999). Nowadays in Scotland this is nearer £2000 (ISD Scotland 2010). This estimated figure does not take into account the often prolonged hospital stay and the long recovery trajectory these patients require which would undoubtedly be much more costly. The main cost is the specialist staff required to provide care to the patients. More than fifteen years ago, Metcalf and McPherson (1995) studied the provision of intensive care units in England and estimated that the nursing staff resource accounted for 75% of its costs, although the Department of Health (2000a) has reduced this figure to 50-60% in its last assessment. However, inarguably it is still a substantial expenditure to a healthcare budget, particularly in today's economically constrained healthcare

settings. The high staffing costs are a result of the required patient to nursing staff ratio maintained in intensive care units of 1:1, a ratio not seen anywhere else in the hospital setting but necessary to care for critically ill patients. The level of care that patients admitted to ICU require is usually classified as either Level 2 or Level 3[1].

2.3 Nursing 'care'

The ratio of nurses to patients is maintained at high levels in order that high quality intensively maintained care can be provided, in an area, that Brown (1991) describes as a developing area of healthcare; "rapidly changing…complex and dynamic" (p240). There is a wealth of literature around caring and nursing 'care', a thesis itself in fact. This is unsurprising considering that caring is fundamental to nursing, regardless of speciality, with the notion of caring being "a pivotal factor in becoming a nurse" (Ousey & Johnson 2007 p151). Despite this axiom, it appears to be difficult to define in the literature. Leininger (1981) extensively considered the phenomena of caring and its importance for nursing practice asserting that it distinguishes the discipline to others in healthcare settings. It is "the largely unknown ingredient for helping mankind in wellness, illness and stressful situations" (Leininger 1981 p4). Mckenna (1993) describes the highest ranking behaviours that are constituted to be 'caring' as attentive listening, comforting, honesty, patience, responsibility, providing information to allow patients to make an informed decision, touch, sensitivity, respect and calling the patient by name. Understandably, Savage (1997) suggests that the notion of caring is subjective and therefore immeasurable and Paley (2001) argues that the perceptions of caring are often, what it is trying to be achieved, rather than the actual actions of caring itself. This perhaps reflects a healthcare that is concerned with monitoring patient outcomes which overlooks the details of the

[1] Levels of ICU care: Level 2, in brief, is assigned to patients requiring a greater degree of observation and monitoring or those with a single organ failure requiring additional support or monitoring (excluding respiratory support). Level 3, is assigned to patients with requiring respiratory support and monitoring and have two or more organ failures requiring additional support and/or monitoring (Intensive Care Society 2009)

process undertaken to achieve them, and consequently any implications. Furthermore, it is suggested that caring is a practice so embedded into nursing practice that it is often taken for granted, even hidden (Mckenna 1993). The notion of 'care' being hidden reflects intuitive behaviours in nursing; it undoubtedly takes place and affects its recipients, but the action itself is difficult to describe to others. Yet, even without a clear definition of 'caring'; essentially, 'caring' is what underpins the role of a nurse.

Caring in ICU has been recognised as specifically different, namely the technological environment itself changes the capacity and form of the care nurses deliver. This is explored further in the next chapter as is the intensity of caring for a patient at a 1:1 ratio. Due to the technological nature of ICUs, many perceive that intensive care units' emphasis is on 'cure' rather than 'care', although it is argued the focus of ICU nurses is providing high standards of 'care' (Heskins 1997). Galvin (2010) is one such author that has identified that ICU care is different, not less or sub standard, just different. The sentiment and motivation of 'caring' is not different just the way in which it is mediated in nursing practice. She suggests that in order to ensure that intensive care 'caring' does not become suffocated by practices that are more technical and scientifically based "a complex integration of knowledge for 'head', 'hand' and 'heart" is required (Galvin 2010 p169). The 'head' refers to the technical skills a nurse will acquire and require, the 'head' is concerned with evidenced based medicine and the use of protocols and guidelines, and the 'heart' is knowledge of ethical, moral and humanity issues. If the nurse is to embrace each of these dimensions successfully she will first need the underlying knowledge of each.

2.4 Nursing knowledge

Nursing work is justified through their knowledge and understanding of the patient as an individual (Henderson 2006).

2.4.1 Patterns of knowing

In 1978 Carper presented her seminal paper on the patterns of knowing in nursing. It offered a classification of the different sources of knowledge and beliefs used to inform nursing practice. Four patterns of knowledge are identified, which intended at the time to illustrate that knowledge was not solely derived from empirical

knowledge, science, and that attitudes and actions of nurses merited equal consideration. It is now widely acknowledged that the formation of proficiency and skill in nursing *requires* the formation of knowledge, the four patterns Carper (1978) asserted are empirical knowledge, aesthetic knowledge, personal knowledge and ethical knowledge.

Empirical knowledge

The empirical aspect of knowledge is the science of nursing. It is objective, dealing with facts; it is something firm with end points and answers. Carper (1978) describes it as "exemplary, discursively formulated, and publicly verifiable" (p15). It is such types of objective and scientific knowledge that are often associated with medicine, in the form of experimental research such as randomised controlled trials. However there is inarguably an essential place and need for this form of knowledge in healthcare care practice, including nursing practice.

Aesthetic knowledge

Aesthetic meanings of nursing (the art) are, according to Carper (1978), "expressive rather than merely formal and descriptive" (p16). It is knowledge gathered as a result of the nurses own unique experiences. This type of knowledge is insightful and requires the nurse to be empathetic, a skill that can only be developed over time and as the nurse gains clinical experience;

"The more skilled the nurse becomes in perceiving and empathizing with the lives of others, the more knowledge or understanding will be gained of alternate modes of perceiving reality. The nurse will thereby have available a larger repertoire of choices in designing and providing nursing care that is effective and satisfying. At the same time, increased awareness of the variety of subjective experiences will heighten the complexity and difficulty of the decision making involved." (Carper 1978 p18).

This links with the nurse's role as patients' advocate, being able to consider the patients needs and wants in addition to the benefits of clinical interventions in the delivery of their nursing care, assuming a more intuitive role, instead of a structured, task orientated way of delivering care that arguably less experienced nurses adopt (Benner, Tanner, & Chesla 1992).

Personal knowledge

It is when the patient is viewed as a person and not as a category of illness (Carper 1978). It insists that the nurse build a personal relationship with the patient, or as White (1995) suggests they should think the patient "matters" (p77). It has been argued to be the most difficult component in the development of knowledge. It appears this difficulty arises from the complexities involved to master it (Carper 1978) and challenges involved to teach it (Carper 1978, Leenerts 2003). The nurses will develop this element of knowing also as their nursing experience develops; it allows them to engage with the patient rather than detach themselves from them. They will be able to offer and demonstrate understanding of the patient experience and perspective for which they are caring (Mayeroff 1971). Equally this is linked with the notion of advocacy as noted above, personal knowing is dependent upon a nurse's experience, their 'world', to guide the care experience they can and actually deliver to the patient *in* their 'care'. The personal relationship nurses build with their patients in intensive care according to Vouzavali et al (2010) , are much more 'intense' than currently recognised, describing feelings of "love" (p143) but also possessive traits, nurses suggesting they felt the patient belonged to them.

Ethical (moral) knowledge

Carper (1978) refers to this as the caring component of knowledge and is noted as being often the most difficult for the nurses to grasp. Wong (1998) offers an example of moral knowledge in nursing practice. She considers the case of an unconscious palliative patient. The ward protocol indicates that palliative patients should have their position changed every three hours, however each time the patient is moved the fluid accumulation in their lungs is slightly alleviated, in essence prolonging the patient's illness. The nurses decide that this is in fact unethical and halt the three hourly position changes as this is more comfortable for the patient. The nurses have decided upon an action that falls outside usual ethical codes and this is what Carper (1978) suggests is the moral component of knowledge. Moral dilemmas arise when the consequences of actions are unknown, difficult to predict, oppose traditional principles, and where ethical codes offer no help or only contradiction (Carper 1978). Whereas, Zaner (1988) suggests it almost impossible to facilitate moral decision making in healthcare because of the "autonomy and rights" (p292) held

by all caregivers. These concepts require "cooperation and collaboration" (White 1995 p80) which is not always possible or to which people are not always amenable. The ethical pattern of knowledge also requires nurses to make decisions bearing in mind current professional standards, codes and values and understanding the implications of the choices that they make. Gadow (1980) stressed the importance of this knowledge suggesting it should encompass

"…the effort to help persons become clear about what they want to do, by helping them discern their values in the situation and on the basis of that self examination, to reach decisions which express their reaffirmed, perhaps recreated, complex of values." (p44).

In the case of ICU patients Gadow's proposal is difficult as many patients are sedated and mechanically ventilated; unable to voice their values on which decisions should be made. Here the researcher suggests that ICU nurses knowledge is informed by the patients nearest relatives, where possible, but also drawing upon their nursing experiences and 'knowing' achieved through their nursing experience. Arguably this is not a 'perfect' solution and concurs with the feelings of both Carper (1978) and Zaner (1988).

Socio-political knowledge

White (1995) suggests that nowadays to reflect current healthcare an additional element of knowing should be considered, rather than focusing purely upon the 'who', the 'how' and the 'what' we should also consider the 'wherein'. It requires the nurse to remove themselves from introspective nurse-patient relationship and consider the broader healthcare context in which they are delivering care. Nurses' roles and nurse-patient relationships are influenced by social, political and economical environments; affect subsequent delivery of care. Nurses are faced with patients from a myriad of social and economic backgrounds. This may reflect poverty, malnutrition, but equally, less comfortably, issues such as drug dependency. Furthermore, nursing remains less influential on healthcare decisions, partly perhaps due to its dominant counterparts, medicine. White (1995) argues that nursing must change this, they are the "prized" (p84) profession of those have had experience of

their knowledge and care but this seems overlooked during decision making. Moreover, a consequence of these subservient-like behaviours, coupled with resource allocation and stringent cost saving measures in healthcare means that nowadays "Nurses are expected to do more with less in the face of staffing shortages, higher patient acuity, and increased role responsibilities" (LaSala 2009 p429). Nurses need to become more assertive in their practices to ensure that the quality of patients care is not being compromised with increasing socio-political demands but in addition society needs to recognise the constraints and consider these in their perceptions of today's nursing profession.

2.5 Research based evidence as knowledge

Traditionally clinical experience, observations, understanding of pathophysiological principles and common sense were deemed sufficient to guide clinical practice (Evidence-Based Medicine Working Group 1992) but now research based evidence has gathered momentum and now underpins many practices across healthcare, ensuring that the delivery of care based upon the best available evidence; with regular review dates in order to keep up-to-date with any advances or changes to the evidence. The research based evidence approach has clearly not called for the complete eradication of clinical expertise and common sense, instead suggesting that all the concepts should work together; essentially providing better care (Rolfe 1998). Yet, this is arguable when such statements as "Evidence-based medicine de-emphasises intuition [and] unsystematic clinical experience...and stresses the examination of evidence from clinical research" (Evidence-Based Medicine Working Group 1992 p2420) merit scrutiny and reflection. It is perhaps no wonder that research based evidence has been slowly integrated into nursing practice as it potentially undermines a key notion, intuition, which underpins nursing knowledge and practice (Benner 1984b). Later in this thesis the researcher has explored research based evidence sedation practices that have, and are being integrated in ICU, the value of these and why caution may need to be exercised in their adoption.

2.6 Summary of chapter

Intensive care units care for the critically ill, the cost of such care is high and optimal patient care delivery relies upon the healthcare staffs' breath of knowledge,

experience and critical thinking. As Carper (1978) illustrates these three components will strongly influence nurses' reasoning and patient care they can and do deliver. Nurses develop knowledge through their spans of duty their knowledge is fundamental in their clinical decision making processes. There is a moral and ethical need to ensure that we are delivering the best possible care to patients; something that research based evidence endeavours to do. However, it would appear that it is perceived as being too medically dominated for nursing practice with clinical expertise appearing to be less valued in the delivery of nursing care. Although arguably, as White (1995) proposed nursing may not be asserting its influence strongly enough to let its 'voice' be heard in regards to practice changes and decisions. The perceived lack of insight into the patterns of nursing knowledge and value nurses place on 'knowing' their patients ultimately has significant implications for nursing behaviours and decision making.

Chapter 3: Technology and the Intensive Care Unit

"We have reconfigured the natural world into devices and machines that function as our servants" (Polkinghorne 2004 p11).

3.1 Overview of chapter

This chapter will review the literature surrounding 'technology' in Intensive Care Units (ICU). Although technology is available and utilised across healthcare, ICUs are undoubtedly areas that are renowned for being vastly technological. Technologies are commonplace in ICU, are advancing rapidly, and have many facets. The role of ICU technology is significant, offering data and information that clinicians use and 'need' to assist in the diagnosing, management and treatment of patients. However, as this chapter will argue, the emphasis should be less on the amount of 'data' technology can provide and more on the quality and utility of any 'data' obtained for the direct clinical benefit of the individual patient. The increasing availability and use of technology, not exclusively in healthcare settings, has not been welcomed by all. Some of the early philosophically based technology literature had foreseen the potential influences on humans. However, rather than being preoccupied with technology's effects in a physical sense, the focus settled on the 'essence' of technology and its ability to capture the attention and influence the responses (provision of care) of its users. There is a wealth of literature exploring nurses use of, and relationship with, the ever increasing technology in their practice, their feelings of unease about technology's role in ICU, but also its advantages for their intensive care 'world'. The physical effects and essence of technology are examined in detail in this chapter to set the context for the exploration of ICU technology in general and the use of responsiveness monitoring to manage patients sedation in particular.

3.2 Technology

The word technology originates from the Greek term *techne*, meaning craftsmanship; making or doing. The researcher underwent much deliberation about whether the word 'technology' should be the term used in this thesis. In the published literature it

appears an all-encompassing word with seemingly endless boundaries, or in many instances its definition is in fact overlooked completely, authors making no reference to a definition or of the context in which the technology is used. Polkinghorne (2004) acknowledges that technology takes on several different, and potentially confusing, meanings. Contemporary uses of the word technology, range from "technology as a collection of skills and knowledge used to reshape nature", or "knowledge and skills based on modern science (the age of technology)" or lastly, "technology as a term used to refer to the things and devices produced by the application of skills and knowledge (i.e. computers, cell phones and other technical instruments)" (p11-12). It is the latter of Polkinghorne's offerings that relates most closely to this doctoral study. The ICU literature refers to technology as "machines" (McConnell 1990 p45), "...life-support equipment, monitoring" (Alasad 2002 p407) or simply "equipment" (Bennun 2004 p241). Of interest, Bennun (2004) also suggests that the ICU nurses themselves are a 'technology' in addition to the equipment. The researcher did consider the use of the term 'monitoring' instead of technology, obviously linking with the 'sedation (responsiveness) monitor', a key area examined later. However, due to the overwhelming use of the term 'technology' in the literature, and that it appeared widely accepted to encompass a vast number of *technologies,* the term monitoring was felt to be too specific. In addition 'technology' was the term used by the nurses during their interviews to discuss the technical aspects of ICU more so than monitoring. Furthermore, to support the researcher's decision, Puri and colleagues (2009) state that "Technologies are used to monitor"; monitoring is only possible because of the technological interfaces it presents itself on. Notably though 'data' from technologies only becomes 'information', something clinically useful, if presented in a way that users can interpret and understand the information displayed; ultimately leading to patient benefit. If technology is not competently understood, managed and used for its intended purpose there are potential implications for patient care. This is particularly important point, considered in more detail later in this chapter in regards to the use of the Pulmonary Artery Catheter (PAC) in ICU.

Heidegger (1954)[2] reported that if people were asked the question "What is technology?" they generally responded in such a way suggesting it is "a means and a human activity" (p4); re-emphasising the (necessary) human interactions with technology. He points out that "humans make use of sophisticated scientific instruments and tools as the means of achieving results" (Polkinghorne 2004 p39). Supported by the quote at the start of the chapter where Polkinghorne (2004) states that we use technology as our servant; something to serve us.

3.3 Technology in ICU

This doctoral study is concerned with the ICU setting and therefore focuses upon, the use of, and implications of, technology used in this setting. ICUs are defined by the technologies that dominate them; they are a 'haven' for the most up-to-date technology. It is certainly the first thing that would strike you as you walk through the door of any ICU, predominantly due to the nature of its demanding behaviours; flashing lights and attention seeking alarms. Cooper (1993) concurs and describes ICUs as being "inescapably distinguished and defined by technology" (p24), and Wikstrom and Larsson (2004) suggest they are the most technically advanced environments in any hospital. ICUs demonstrate that a "cornucopia of new technology exists, and that a new technologic age is here" (Brown 1991 p240). Gardner (1974) described the technology of an ICU as "…awe-inspiring, if not frankly frightening..." (p36). The descriptions offered by the authors clearly illustrate that technology is a significant part of the ICU 'world'. Some were, of course, published several decades ago when 'technology' was more novel and more recently Henderson (2006) suggests that technological devices are now "...an accepted accessory to contemporary healthcare" (p60).

3.4 The purpose of technology in ICU

Technology appears to have different facets in healthcare and Polkinghorne (2004) suggests that the context in which the term 'technology' is used offers clarification of its purpose. The researcher has identified four features of ICU technology as:

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2 Heidegger: The researcher reflects upon the serendipity of their choice of Heideggerian philosophy to guide the theoretical perspective (see Chapter 6) of this doctoral study and to later discover his interest in the topic of 'technology'.

- An alert – to draw attention to or assist in avoiding adverse events
- A test – diagnostic
- A decision making aid – to guide therapies and decision making potentially changing patient outcomes
- A treatment

The researcher acknowledges the importance of each of these features but for the purposes of this doctoral study has chosen to focus upon technology as an alert and as a decision making aid. The reason for this is linked to the clinical decision making focus of the study and the purpose of the new responsiveness (sedation) monitor explored with ICU nurses during their interviews.

3.4.1 Technology as an alert

The notion of alerts is embedded within patient safety, a priority area in healthcare settings. In order to provide the context of technology as an alert, the researcher felt it important to set the scene of patient safety, briefly review the non-technological alerts that are used in less technological settings in healthcare before reviewing the use technologies alarms thereafter.

Patient safety

Patient safety has the potential to be achieved in three different ways: through prevention, through early detection of sub optimal conditions or as a response to something.

As described earlier one way in which healthcare is responding to improve patient safety, is with national safety programmes, such as the Scottish Patient Safety Programme (SPSP)(NHS Quality Improvement Scotland 2009), specifically aimed at improving critical care outcomes. It is using a combination of evidence-based tools and techniques to improve the reliability and safety of everyday health care systems and processes (see p2).

Protocols and early warning systems

In a bid to 'prevent' patient safety issues arising, healthcare has adopted the use of guidelines, protocols and checklists to standardise care and reduce human errors, advocated by other industries such as aviation (Leape 1994) and which have been demonstrated to increase patient safety (Vincent 2011). Early detection of 'at risk' patients in general wards is being addressed using Standardised Early Warning Systems (SEWS), also known as, track and trigger systems (Cuthbertson & Smith 2007;Johnstone, Rattray, & Myers 2007). SEWS is a recording chart which has been developed to standardise the monitoring, assessment and active management of acutely ill adults in hospital (see Appendix 2 for an example). When a number of sub optimal physiological parameters have been recorded during routine observations it has been designed in such a way as to alert and direct the user to take a certain course of action. Notably though, such early warning systems are heavily reliant on the user and hence will only be as effective as their user. This has been demonstrated in a number of studies where the SEWS charts are not completed fully or the user does not respond or make decisions that reflect the information the scores are indicating for patients, and hence fails to act as an early warning at all (Gordon & Beckett 2011).

Computerised adverse event reporting

A relatively new concept in healthcare is the adoption of the concepts of 'adverse events' and near miss reporting using computerised patient safety 'software' such as 'Datix' (Datix 2008). It is essentially been developed both in response to the need to improve patient safety and in the longer term a preventative strategy, identifying and highlighting areas of practice where patient safety is at risk. It advocates and promotes the reporting and recording of adverse events or near misses that occur in practice but again, is also reliant on users entering the adverse events and near misses and therefore cannot account for events that are not reported nor those not recognised as being adverse events or near misses. There are inevitably unreported incidences. Unfortunately, these unreported incidences according to Leape (1994) are cultivated by healthcare organisations because of an embedded 'blame culture' and a failure to develop systems to expect adverse events.

3.4.1.2 Alarms

In order to 'prevent' patient safety issues arising in ICU, the technology takes the form of built in alarms and alerts. Although healthcare technologies are not exclusively used in ICU they are more prevalent than in general ward settings, the latter using more protocols, checklist and EWS as already described. Alarms and alerts are warnings to let the user know something has deviated from the optimal or pre-defined acceptable levels. Alarms built in to ICU technology act as a safety mechanism for its users but these are not failsafe. There is an essential need for alarms in ICU simply due to the complexity of their patients' condition and the vast number of technologies in use. Alarms in ICU are plentiful and deliberately attention seeking, visually - flashing colours, audibly - loud beeping noises or a combination of both. The alarms aim to improve care and safety (Blum & Tremper 2010). They alert; reducing the opportunity for patient clinical changes to be missed. However, many alarms have been proven to be false alarms and could actually be increasing an ICU nurse's workload. It was considered whether 'false alarms' was the most appropriate term to use and whether an 'early warning' was a more suitable term. Görges and colleagues (2009) used the term 'false', and they defended its use, stating that 'false' indicated that the technology was alarming because the patient had moved position, coughed or staff were manipulating the technology; it was a motion induced alarm. This is a noteworthy as 'false' alarms are potentially destined to increase with the more wakeful ICU patient group that is intended, this is described in the next chapter. Görges and colleagues (2009) study reported that physically having to silence alarms equated to approximately 16% of a nurse's bedside tasks. Furthermore, from the study's two hundred hours of observation they concluded that only 23% of the alarms exhibited were effective; initiating a technical action or a patient action. The study reported that in excess of >90% of alarms that sound in the ICU are actually false positives or 'false alarms' (Görges et al. 2009). The burden of 'false alarms' is well documented, particularly that after prolonged false positives, alarms are likely to be dismissed, silenced, or not arouse the user in the manner they are intended to (Meredith & Edworthy 1995). This is a potentially serious problem; alarms losing their 'alarming-ness'.

Categories of Alarm

There are an abundance of alarms in ICU. Types of alarm vary and nurses are noted as prioritising alarms and are able to identify them often without having to see them physically. Sanderson (2009) published considerable literature surrounding the identification of and 'learnability' of medical equipment alarms in the area of anaesthesia and intensive care. She alludes to an international standard (IEC 60601-1-8) put in place in 2005 that provided guidelines on how to make auditory alarms on medical electrical equipment more recognisable and discriminable. The justification being that patient safety relies upon alarms being easily distinguished. Unfortunately, the guidelines do not insist that the manufacturers test these alarms and their tones or tunes with the representative users beforehand (Sanderson 2009). A study has been undertaken to examine nurses' and doctors' ability to recognise a selection of alarms. Some of the alarms were developed to have melodic tunes, thought to be more meaningful to the listener, and others without. The participants listened to the alarms in two phases, set four to seven days apart. The researchers reported that fewer than 30% of the participants could identify the alarms with 100% accuracy following training (Sanderson, Wee, & Lacherez 2006). In addition, they also reported that the participants responded more quickly and accurately to medium priority alarms rather than high priority alarms, despite the participants reporting that the high priority alarms sounded more urgent (Sanderson, Wee, & Lacherez 2006). As earlier acknowledged, it is proposed that people can only reliably identify five or six alarms, yet still, the alarm standard set in 2005 proposes eight categories of alarms, immediately reducing the identification accuracy for users (Sanderson 2009) and inarguably safety.

A small (n=26), local, single centre study, using Sanderson's work as a platform, aimed to determine how well their staff could correctly identify the alarms in their ICU. The results revealed that nursing staff were able to identify alarms more accurately than the medical staff; 83% versus 43% (p=0.0001). Explanations offered by the authors for this statistically significant difference were that nurses spend more time in direct contact with the ICU technologies and at the patient's bedside, and furthermore the length of time each group had worked in ICU was notably different;

11.5 years for nursing staff and 3.75 years for medical staff (Allan, Milligan, & Cuthill 2010). This is a very relevant issue, in contemporary healthcare settings; there is a large staff turnover, especially trainee medical staff usually working a limited period in ICU as part of a trainee rotation through different specialties. Furthermore, linking back to the previous chapter the arguments offered would indicate that 'knowing' patients and clinical experience will potentially influence patient care and clinical decisions surrounding this care.

Alarm Prioritisation

In order to contend with all the alarms they are often prioritised, which can lead to some alarms being silenced or turned off. The researcher is not aware of a protocol or standard currently available within the United Kingdom that states alarms should not be silenced. Whether this will change with the patient safety drive is uncertain, particularly as noted earlier, alarms are a patient safety issue. In the US, the American Association of Anesthesiologists did adopt recommendations from the Anesthetists Patient Safety foundation in 2004 alarm summit, whereby pulse oximetry[3] and $C0_2$[4] auditory alarms should *always* be on and *always* audible (Wee & Sanderson 2008). There are special circumstances when usually all alarms are silenced for instance if a patient is dying or palliative care is ongoing. Furthermore there appears to be no guidance about who should be responsible for silencing alarms or who should be setting the parameters of alarms; it can only be inferred it is clinician preference. Arguably, an expert clinician will use their experience and expertise to make the judgement but novice clinicians are perhaps more at risk of setting inappropriate parameters or silence alarms unnecessarily.

Blum and Tremper (2010) highlight that there is an obvious clinician *need* for ICU alarms to be further studied commercially and academically. Alarms still "favour(s) sensitivity in problem detection over specificity" (Blum & Tremper 2010 p702), which

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[3] Pulse oximetry: A non-invasive method allowing the monitoring of the oxygenation of a patient's haemoglobin. A sensor is placed on a thin part of the patient's body, usually a fingertip or earlobe.

[4] $C0_2$ Monitoring: This refers to end-tidal carbon dioxide monitoring. It is a non invasive measurement of exhaled carbon dioxide. The concentration of expired carbon dioxide can be measured directly at the patient-ventilator interface.

may not reflect actual priority of need in the patient. The findings in Chapter 7.2, Technology in ICU, explored the issue of alarms with the ICU nurses and their feelings and views regarding them in practice (see p149).

3.4.2 Technology as a decision making aid

Another face of technology is as a decision making aid to help guide therapies which in turn, will affect and pursue optimal patient outcomes. Importantly the guidance offered by these types of technology will only be beneficial if it is interpreted and applied correctly. An example of this in terms of ICU technology is that of the pulmonary artery catheter (PAC). The PAC came into use in the 1970's. It is an invasive procedure whereby a catheter is inserted through a vein and 'floated' into the

right-side of the heart. Its purpose is to demonstrate how well the left-side of the heart is functioning and indicate whether the patient requires such as additional medication

or intravenous fluids for optimal outcomes. Unfortunately, it entered ICU practice without any definitive evidence that it actually improved outcomes for patients in whom one was inserted, in terms of mortality and morbidity (Sandham et al. 2003). There are inherent risks involved in placing such an invasive device and therefore it seems instinctive to ensure the user has an understanding of the information it is providing, as Cruz and Franklin (2001) highlight "Understanding the information it provides and making thoughtful therapeutic decisions lie at the core of its use" (p271). Yet, this was not the case for the PAC. It was not always utilised in the way it was intended and it became apparent that in the drive to 'optimise patients' in reality the 'optimisation of numbers' occurred instead. Unfortunately PACs are not the only ICU technology lacking evidence for its use in practice. According to Bellomo and Uchino (2003), ICU technologies, namely invasive hemodynamic monitoring, such as the PAC mentioned, severely lack evidence that determines that their use results in better patient outcomes. They suggest there is only a tenuous link between physiological gain and final clinical outcome. They point out that there is little formal validation of such invasive monitoring, although widely used and strongly believed to benefit patients. They rightly state "If we did not [believe], we would not have ICUs" (p225). They continue by suggesting a formal assessment of the efficacy

and effectiveness of ICU technologies used to guide decisions in order to avoid a repeat PAC catheter scenario (Bellomo & Uchino 2003). Moreover, they propose the true way to establish whether real benefits are gained by the patients, would be to perform a randomised control trial of the invasive technologies in use, accepting that the ethical implications and lack of clinical equipoise make this challenging to do. It would appear that there are several challenging steps that require consideration when using technology to aid decision making. The technological device must provide appropriate and relevant data and be used and interpreted correctly, the user able to figure out correctly what should be done in view of the data obtained. The subsequent action(s) required must be correctly and consistently followed. More important, arguably, the user must know for which patients the technology will be of benefit and not merely employ technology just because it is there. The challenges listed were clearly overlooked in the case of the PAC.

3.4.2.1 Technology and competence

It is clearly emerging from the available literature that the effect of technology on patients' care may greatly depend upon the 'user' directly in charge of it. This argument is particularly important when considering the experience of the 'user' or for the purposes of this doctoral study the experience of the nurse. The experience of the nurse and essentially their comfortableness with a piece of technology; knowing enough about its workings to trust and believe it, but also and perhaps more importantly, when not to will inarguably effect their care delivery. According to Wilkinson (1992), inexperienced nurses are at risk of letting the technology swamp their time, being easily drawn from the patient focus as the technology envelops them. Mann (1992) concurs, suggesting that the inexperienced nurse could become completely focused on the patient; turning her attentions to what she knows and what she is comfortable with, and ignoring, or attempting to forget, technology due to poor understanding and a lack of confidence (Mann 1992). As nurses gather experience, they become significantly more patient focused (Laing 1982). It is thought that, with experience, a nurse is more likely to focus on the patient in a given situation rather than on equipment or technical factors; be able to deliver holistic care. Supported by Radwin's (1998) study's findings, which examined the attributes of nursing experience, reporting that as experience grew "they became less and less focused on

procedural [technological] care and more focused on the patient who had the procedure" (p592). This links back to the work of Carper (1978) and her patterns of knowledge, specifically the fourth pattern; personal knowledge. This skill is supposedly reached once nurses have reached a level of comfort with technology (Ray 1987 cited in Radwin 1998 p593).

3.5 Nursing and technology

Heidegger, according to Polkinghorne (2004), potently expressed the fear that as people possess understanding of technology they

"…will no longer be human (Dasein), because we will have become so entrapped by technology that we will not realize that there are other, richer ways in which being can show itself" (p42).

Heidegger believed that it is as Dasein's, our responsibility to ensure we use technology to our advantage rather than the opposite occurring, he says:

"Everything depends on our manipulating technology in the proper manner as a means. We will, as we say, 'get' technology 'intelligently in hand'. We will master it. The will to mastery becomes all the more urgent, the more technology threatens to slip from human control" (Heidegger and Krell 1977 p289).

He appears at pains to recognise that technology is obviously a great advantage, offering, once unimaginable solutions, but nevertheless we should remain patient-centred and not allow it to "dominate…warp, confuse and lay waste our nature" (p54). Heidegger's view of technology highlights that there may be four ways in which technology can influence, and potentially distract nurses from, patient care (Table 1).

Number	The potential influence and distraction of technology for nurses
1	Domination of nurses attention
2	It cannot deliver a holistic 'picture' of the patient
3	It malfunctions and can deliver erroneous data
4	Its data can be misinterpreted and therefore misused if the nurse lacks knowledge and/or experience in its use and rationale

Table 1: The potential influences and distractions of technology in nurses' clinical practice

The latter of the influences is important in current healthcare as many aspects of learning are becoming increasingly 'competency based' and less 'experienced based'. There appears to be an ever increasing volume of, what can be identified colloquially as, 'stuff' that needs to be learnt, or perhaps as Heidegger (1977) earlier suggested, 'mastered', by clinical staff. It would be easy to interpret, and even misunderstand, Heidegger's technological stance as outdated; technology has progressed and advanced from his era. However, instead, Heidegger in fact described the essence of technology *for* the future, his philosophical perspective delivering foresight of exactly how technology would shape our lives and Being. The essence of technology, *Gestell,* as Heidegger calls it, is not the physical technological devices but the spiritual possibilities of technology: the 'spirit of technology'. *Gestell* is the power of technology, its ability to capture Beings attention and occupy their time to the potential detriment of their personal Being and other Beings. He describes the struggle he foresees humans having integrating technology into their Being-lives and to confidently find where technologies should be situated.

It is clear from the above discussion that in the past the patient, or perhaps more correctly patient-centeredness has been forgotten or displaced by the exciting and enticing qualities and advancements of technologies available. On the other hand, the need for technology, in terms of advancements in patient care, patient survival and patient safety is clear. Nevertheless many continue to argue that technology dehumanises, depersonalises and leads to a loss of patient individuality and dignity (Calne 1994;Dean 1998;Little 2000;Mackellaig 1995;Walters 1995). Almerud (2008) uses words such as 'sabotage'; 'compromise' and 'impedes' to describe the effect of technology for interpersonal relations; she strongly believes that within the

ICU, technology is at the top of the hierarchical chain. Can nursing and technology form a harmonious relationship? Barnard and Sandelowski (2001) are not alone in arguing that technology separates nurses from their mission to care. Technology appears the antithesis of the art of nursing, logical scientific technology in diametrical opposition from intuition, the latter arguably embedded in expert nursing practice (Benner 1984a). Henderson (2006) suggests that due to the evolving nature of technology "the interaction between nurse and technology is rarely neutral" (p60). Technology and nurses have, she proposes, a "dynamic relationship that potentially can assist nurses make a significant contribution to making a difference to patient care and optimally patient outcomes" (p60). However, within ICUs though, it is easy to overlook a patient due to technology, they are a "claustrophobic conglomeration of flashing lights and alarm(ing) bells, in which the patient, isolated from warmth of human contact, languishes in obscurity" (Pope 1972 p156). Heidegger (1977) argued that technology is both a "human activity [and] a means to an end" (p288); he strongly believes that they belong together, his fears are that technology in isolation will rule instead of a partnership being formed. Similarly, Almerud and colleagues (2007) agree, machinery cannot be used to substitute human touch, empathy or closeness. Sandelowski (1999) quotes work from a doctoral thesis (McConnell 1987), saying "nurses and nursing were the soft technology that tied sympathy to science: the interface between physician and patient, and machine, accommodating the one to the other" (p199). Lumb (1989) concurs and described critical care nurses as "the necessary link between patient and machine and between compassion and abstraction" (p7). A partnership, when considering Cooper's (1993) comments, is difficult to achieve in ICU because

"Technology in the ICU is designed to be invincible, invulnerable, objective, unfeeling, and predictable, in contrast to the human characteristics of vulnerability, subjectivity, and unpredictability" (p25).

It is easy to see why for decades the literature has expressed fears that the patient, for whom all this technology is delivered, has the potential to be lost. On the other hand, as already mentioned without contemporary technologies the restoration of health to the critically ill may not be possible. Galvin (2010), acknowledging the previous anxieties, points out that with ICU technology "...there is a risk of routinely viewing patients as physiological systems and responses to therapies if the balance is not right"

(p170). The balance referred to by Galvin (2010) is that of carefully watching and interpreting what the technology is telling you, yet still remaining patient focused and centred, remembering that observing and assessing the patient is as equally important as observing and assessing the technology; this is the task that nurses are faced with. Similarly Polkinghorne (2004) argues

"The technification of the practices of care devalues the uniqueness of the human realm by treating its members as if they were simply another resource to be processed. Such treatment, because of the evolved characteristics of the human realm, is not as effective and efficient in achieving the aims of practices of care" (p1).

However, rightly so Galvin (2010) proposes that there is most definitely a place for both human touch and technology. There will be occasions where it is essential that they are used to complement each other, filling the gap the other *cannot* fill,

"There will be times when it is necessary and legitimate to prioritize the technical, to support the body through collapse, and to embrace objectification. There will be other times when it is important to mitigate the objective gaze for the sake of restoring the person as a being with a past, present and future" (p170).

Clearly the necessity to treat 'scientifically' the complexities of contemporary illnesses, must not dominate but be in partnership with nursing care priorities driven by experiential knowledge. Yet, this is not a new concept, despite the ongoing technology and nursing 'debate'. Over three decades ago Van den Berg (1978) highlighted that healthcare was incomplete when the focus was purely physiological and anatomical. The plethora of technologies available to nursing staff, according to Pope (1974), should be designed in such a way as "that they should aid the nurse, not obstruct her; they should inform, not confuse" (p156). It is the primacy of the efficiency benefits often associated with technology that jeopardises the nurse-patient relationship that nursing prides itself upon (Gardner 1974). Pope believed that technology was one of a nurse's "tools of trade" (1974 p156). ICU is not the only area of healthcare being affected by the increase in technologies. Bevan's (1998) paper explores the impact of technology in a dialysis unit and asserts that the increasing demands for dialysis is not just a reflection of the changing human population but the

technology available to provide it, he refers to it as "care on the production line" (p731).

It is no surprise then that many nurses felt that "competent technological management constituted a major form of care" (Cooper 1993 p26). Wichowski (1994) reported that "technology is the first order and structures a nurse's day – technology drives the acute care system" (p1165). It is argued, that it is these technical activities of a nurses' day to day work which are viewed as the most stimulating or even, perhaps, the 'real work'; the enticement of technology referred to earlier perhaps? Alasad (2002) was not alone in suggesting that the less technical, 'basic' nursing tasks were viewed as less important and could be carried out by anyone. These thoughts are shared by Almerud and colleagues (2007) who point out that technical tasks often take first priority or are carried out with more urgency compared with other caring behaviours. They do, at least, they refer to technical tasks as caring; the 'art' of the nursing profession. It has been claimed that technology has marginalised 'classical nursing activities' (Almerud 2008). According to Almerud (2008) "within health care, the ache to heal seeks incessantly practical-material ways and means to realise its goal" (electronic citation). Benner (2004) recognised that intensive care was at risk of trivialising what are the key elements of nursing; "comfort...touch...solace" (p346), claiming instead that it becomes fixated on the "highly technical curative techniques" (p348). Interestingly, particularly when reflecting upon the evolution of a nurses' role nowadays, Sandelowski (1988) highlighted that nursing generally was moving towards a more medical model approach to care which was being compounded by technology. She, from what appears a disappointed stance, stated that nurses are

"...becoming like the physician, who touches the patient primarily to obtain information. Medical touch is primarily a proxy sight and is employed largely for its cognitive yield: to get rather than give." (p43).

Galvin (2010) suggests that maintaining a holistic approach to care in ICU is a real challenge for nurses

"Keeping the shining vital person at the centre could be considered as at its most difficult in technological caring situations. Critical care nurses are particularly challenged to know when to give priority to the measurable through the technology available to them, and when

to reduce or balance their importance with the more human, lifeworld dimensions of care" (p170).

Gardner's (1974) work acknowledged these arguments. Even several decades ago he predicted the impact that technology would have on our intensive care units. Yet, even then, maintained that "In spite of the newest and best equipment it still remains true that the nurse is the best monitor available in ITU[5]" (p 36). This concurs with Bennun's (2004) earlier description of technology suggesting that the term technology should be inclusive of the nurses themselves not merely the 'equipment'. Interestingly, a study using a quantitative approach to investigate caring and the influence technology had upon caring, reassuringly (perhaps) reported that the higher technology areas were associated with higher rates of caring (Arthur, Pang, & Wong 2001). It appeared from their analysis that the more that technology impacted on the nurse-patient caring relationship the harder the nurse demonstrated a "caring involvement and caring communication" (p42) compared with those working in less technological areas. Subsequently though, they did identify that in high technology areas the patients were more likely to lose the nurses as their advocates. This is noteworthy as the nurses' interviews for the purpose of this thesis, actually indicated otherwise.

A different tack taken by Taylor (1999) is the suggestion that technology entices us by making us feel, and appear, infallible, something that technology certainly is not. These feelings potentially develop into feelings of power which can envelop the patient and losing sight of the individual being treated. He states that it "places unlimited confidence in the powers of frail human reason; by a trivializing self indulgence that has no stomach for the heroic dimension of life" (Taylor 1999 p155). A rather more radical, yet honest opinion not dissimilar to that of Taylor (1999), is offered by Polkinghorne (2004). He surmises that "A consequence of the advances provided by our technology is that we also have the power to harm and kill people with unprecedented efficiency" (p25). He is by no means saying that healthcare workers are harming and killing their patients, but rather that with all the advances in technology, and the pace at which they are now integrated into practice, there is potential for some

[5] ITU: An abbreviation for 'Intensive Therapy Unit', holds the same meaning as ICU

technologies to be used haphazardly with the risk of negative effects and outcomes. In healthcare this means the delivery of care and related treatments are viewed as the ability to do 'something' rather than the 'right thing'; just because we have the power and technologies to do it. Unfortunately this can be illustrated by the pulmonary artery catheter (PAC) use in ICU described earlier. Although the latter comment by Polkinghorne (2004) is a stark one, it is one reiterated through the available literature. Technology is only as good as its user.

Essentially it would appear that technology is still seen as a threat by many, despite its benefit for patients. Although some of the literature reviewed was written when technology was a relatively novel addition to clinical practice, the philosophical writings foreseen technologies influence which can be easily identified with technologies current position in society. Key messages emerged that span across the timelines and disciplines, reflecting the need in clinical practice needs to find a balance. The researcher used the case of the PAC to illustrate the importance of not just knowing how to use technology but knowing how to use its information effectively, which requires experiential consideration of patients as unique individuals.

3.6 The perceived role of technology in ICU nursing practice

The researcher until now has only modestly considered the published literature reporting the views of the actual 'users' of technology, which for the purposes of this doctoral study is nurses and specifically the implications for nursing practice. Firstly, the researcher argues that nurses whom embark upon a career in ICU must surely already have a positivity surrounding technology or a conscious or even unconscious comfortableness with objects of a technical nature – or why choose to work in what is, inarguably, a technologically intense environment?

Certainly when technology was introduced to nursing in the 1960s and 1970s, according to Carriker and Rosenberg (1966), *nurses* mostly described that it facilitated their nursing practice. However, Wichowski (1994) interviewed nurses regarding technology in their practice and uncovered mixed views. A majority of nurses' favoured technology in a positive light. Particularly, the way in which it

helped patients, expedited their own roles and saved them time, yet some nurses also reported the reverse. What is noteworthy, as pointed out by Wichowski (1994), is that although positive connotations were initially expressed, this was then quickly followed by a number of negative remarks in regards to technology. One nurse declared that technology "freed me up" and yet another complained how technology pilfered her time, stating "I wish we had more time to just be with the patients" (p1165). The conflict riddled responses led the author, Wichowski (1994), to carry out a period of participant observation, were it quickly became apparent that technology dominated a nurses day to day activities. The nurses still communicated with the patients when interacting with technology (regular technical checks were required), so in a sense supporting the technology in its role, but the nurse-patient communication that took place was noted to be limited to mostly non-psychosocial needs. It was these psychosocial needs that the author had presumed were what technology was swamping, but it appeared not, as even with the opportunity to communicate with patients these needs were not addressed. Wichowski (1994) found it incredibly difficult to conclude one way or another whether, in a nurse's view, technology was positive or negative. She stated they were "ambivalent about the benefits" (p1167). She also concluded that it was not necessarily the technology that hindered a nurse from dealing with a patients psychosocial needs, rather it was the organisation of the healthcare system as a whole. Organisational influences and constraints significantly impact upon ICU nurses' roles, reviewed later in the chapter. Wichowski's (1994) findings also links back to the new, fifth element of the patterns of knowledge suggested by White (1995); healthcare is more economically driven, potentially influencing nursing care provided.

McConnell (1990) felt it was essential to speak directly with ICU nurses to uncover the impact that technology had on their nursing practice. She interviewed ten nurses of differing ICU nursing experience, between two and sixteen years, from a mixed specialty adult ICU. The nurses identified that a lack of knowledge about technology increased their fears but that this fear was alleviated by education, enabling them to then use the technology in question as an "adjunct to the patient's care" (p48). After grasping the workings of a machine one nurse said "it becomes another piece of equipment that I use to work with, and, for the patient" (McConnell 1990 p48). Many of

the nurses "readily acknowledged" that various technologies (they were trained in) provided them reassurance and "provided detailed information before a problem became clinically manifest, and increased patient safety" (p48). The nurses McConnell (1990) interviewed also highlighted that the machines could not be trusted completely, that they should be calibrated as required and the nurse should always be "consciously focus[ing] on the patient" to compare with the technology monitoring (p48), supporting the need for the nurses to maintain their skills in basic nursing care too. Ray (1987), through a number of phenomenological interviews, concluded that technology appeared to be the common denominator throughout a nurses ICU experience. Her interviews revealed that ICU nurses viewed their nursing practice in ICU as "intensely human, moral and *technocratic"* (p172, my emphasis).

More recently, Kiekkas and colleagues (2006) investigated the perceptions of technological equipment by intensive care nurses in Greece. They used a validated questionnaire which was completed using a structured interview technique to eliminate any misinterpretation of questions by the nurses participating; one hundred and eighteen questionnaires were completed in total. Approximately half of the nurses who participated had worked in the intensive care environment for greater than ten years; thus giving an even split between novice and expert nurses. The positive and negative effects are summarised in tables below:

Effect	**% agreed**
Increased care effectiveness /patient safety	80.5% / 71.2 %
Easier/faster completion of nursing duties	55.9% / 58.5 %
Improvement of personnel	51.7%
Prestige of personnel	50.0 %

Table 2: Positive effects of ICU technology

Effect	% agreed
Increased patient risk	44.1%
Increased stress of personnel	56.8%
Extraction of attention	44.1%
Extraction of time	45.8%
Restricted autonomy	46.6%
Loss of human sensitivity	37.3%
Increased hospitalization costs	36.5%

Table 3: Negative effects of ICU technology

Many nurses' attributed more effective care and patient safety to be through the use of technology and neither appeared to view it as a major distraction to the care they delivered in terms of either time or attention, nor feel it reduced human sensitivity, the art of nursing. However, they did view it as an additional stress to their nursing practice. When the results were re-evaluated to test for differences between nurses with less than five years' experience, between five to ten years and greater than ten years, no statistical significances were found. Nevertheless, clinically it was significant to see that the less experienced nurses had greater fears of error and stress than their more experienced colleagues. Additionally, education and training surrounding technology was highlighted as extremely important. Bolton (2006) suggests that lack of education and support surrounding technology is a *real* issue, if nurses are unsupported, education is lacking surrounding technology that this could create sub-optimal work environments, in turn increasing nursing staff turnover and undermining patient safety. This effectively links back to the issue of competence that was discussed earlier and the importance of knowledge, experience and clinical judgement. Using phenomenological interviews, McGrath (2008) explored the challenges for critical care nurses of working in a technological setting. Her findings re-emphasised the differences between novice and expert nurses' integration of

technology in to their clinical practice. The expert nurses demonstrated more harmonious working with technology, admiration for the technology and used it to facilitate their care delivery. In contrast the novice nurses experiences resonate with the technology cynics, feelings of stress with both personal and professional consequences. Moreover, McGrath (2008) reports that the journey to technological competence for novice nurses was "...fraught with trepidation" (p1103). Support and assistance for novice nurses particularly in such technological settings as intensive care should not be overlooked and she even suggests that ICU educators have an 'obligation' to acknowledge the needs of the less experienced staff.

3.6.1 Gender, age and technology

It is worth considering the role of gender and age in the use of technology particularly as nursing is traditionally seen as a 'female' role, and the potentially older workforce being enforced by new government policies. The 'female' role of nursing is a consequence of the inarguable 'caring' role nursing occupies in healthcare, and yet technology is seen to be more masculine (Heskins 1997). Therefore ICUs would appear to be trying to merge the traditional female and male traits of both. It has been suggested that the masculinity of technology is perceived to be the reason that many male nurses have pursued a career in the ICU environment (Heskins 1997). Such perceptions have evolved from earlier work by Hudson (1993) suggesting it is the focus of 'cure' in such intensive 'care' areas that draws males to work in these areas. This 'cure' approach would appear to lend itself to a more medical model approach; perhaps highlighting that 'medicine' is still viewed as a predominately male profession perhaps? Furthermore, Dassen and colleagues (1990) reported that twice as many males worked in critical care areas compared with other areas of the hospital. Nevertheless, Heskins (1997) exploration of gender roles and ICU technology, through interviews, demonstrated that the roles are viewed more equally and caring is demonstrated across ICU nursing irrespective of a nurse's gender.

Sipe and colleagues (2003) highlight that age can impact on a nurses ability to interact with technologies and consideration must be given to this issue. They suggest that

"Healthcare organizations must replace overburdened manual processes with technological solutions designed to meet patient needs while supporting a new, 'techno-savvy' work-force that has grown up with computers and technological gadgets" (pS36).

Equally, at the other end of the spectrum they anticipate an older work force and place importance on ensuring that the development of technologies considers this; challenges with small print, bending and lifting.

3.7 Technology: a means of altering patient outcome and meeting organisational targets

Polkinghorne (2004) proposes that "practitioners of care are often employed by institutions under pressure to demonstrate by outcome measures that they are cost effective" (p27). Targets such as these are monitored closely in healthcare, the escalating costs of healthcare in general have pushed for 'high cost' healthcare, such as ICUs to be closely monitored. As mentioned earlier, intensive care is essentially 'expensive' care: £2044 in Scotland per day (ISD Scotland 2010). Therefore technologies must undergo intense scrutiny before they can be purchased for ICUs. A key selling point is there ability to improve outcomes, reduce in ICU and hospital stay, thereby reducing healthcare cost. The outcome preoccupation, however, does not ensure improved immediate patient care. The focus on earlier discharge from ICU or from hospital overlooks the immediate consequences, arguably more potent in the ICU nurses 'world'. However, it appears that the direct, measurable alterations, for example, reduced mortality and earlier discharge from ICU or hospital settings may be viewed as potentially more beneficial than technologies that are used to optimise a patient's clinical state initially, in the short term, but will address length of stay and perhaps readmission issues thereafter, in the longer term. Targets such as mortality and discharge timings are monitored closely in healthcare. Another challenge for ICU nurses is maintaining individualised care when 'outcome' and 'economic' focuses have the tendency to reduce the patients to a 'number'.

3.8 Introducing new technologies

New technologies are introduced to us every day, not exclusively in healthcare; they surround us. Whether they would work without human input has been debated and

links with the earlier discussion suggesting in regards to ICU technology, that it is only as good as its user, or nurse in this case. These thoughts echo the earlier predictions of Heidegger (1977), that the spirit of technology, *Gestell*, could and would potentially enslave its users, place us in its shadows, rather than being able to 'master' its physical capabilities. Furthermore, the reciprocity between the users and technology will influence their successful implementation and integration into clinical practice. This therefore begs the question as to how technology is introduced into practice, that is, to ensure effective users of effective technology that in turn will produce optimal patient outcomes, arguably, at every point of their journey. According to Curtin (1990), by ensuring it has a hefty dose of humanity included. By this she meant that technology needs a high touch component coupled with options, it should not be forced upon people, lots of support and finally training and then more training, *continually* (p8). This links to the earlier findings of Kiekkas and colleagues (2006), where the nurses in their study stated that training and education surrounding technology implementation was of paramount importance. Interestingly, as with much of the technology literature reviewed, Curtin's (1990) work took place several decades ago, but still the nurse and technology 'battle' continues. Does this indicate we have made no progress or perhaps nursing is finding it difficult to keep up with the ever advancing technologies presented to them in healthcare?

3.8.1 Technology design decisions

Involving the frontline users of technology in its development is of paramount importance, although this seems obvious, it is still overlooked. Many nurses believe that the technologies introduced are often just designed "for the market" without any real thought about the main users in practice (McConnell 1990 p49). The nurses interviewed by McConnell clearly stated, that they wanted simple machines and pointed out that many included "a lot of crap on there we don't need" and that they did not want "to have to contend with 22 alarms" either (p49). Alarms were discussed earlier, and it was recognised that there is a limit to the number of alarms a human being can actually correctly identify. The physical design of a piece of technology was also highlighted as important, the larger and more cumbersome the technology was perceived to be the bigger the safety issues surrounding it were. Leslie (2006)

reinforces the need to dedicate some effort into evaluating technologies, he summarises

"Make sure those who use the equipment get a say. Be critical and objective; it's only technology - is it going to save lives, reduce mortality, improve staff satisfaction or just satisfy egos? Just knowing the price isn't enough" (p84).

Hyman (2010) poses an interesting question, that is, 'Should Your Medical Devices Require Intensive Care?'. He sympathises with nurses, as he himself, often wonders if the developers of some devices have any insight into the environment that the device will be eventually used in. Medical technologies are not subject to the same rigorous testing or regulations that pharmaceutical products are. Keenan and colleagues (1999) suggest that evaluation of a new technology should be performed before a piece of technology is accepted into clinical practice; they acknowledge that a full systematic review of the literature for clinical staff is not a realistic or feasible option. They suggest a number of steps should be considered to assess a new piece of technology (Table 4).

1. Does the diagnostic technology work as it should?
2. Does the technology perform to specifications in a laboratory setting?
3. Does the technology provide important diagnostic information in a number of clinical situations?
4. Doe the technology provide information that allows a more accurate assessment of the severity or presence of disease in patients?
5. What is the impact of the diagnostic technology?
6. Does the technology increase healthcare worker confidence?
7. Are therapeutic decisions altered as a result of the technology?
8. Does application of the technology result in benefit to patients?
9. Can I apply the diagnostic technology in my practice?
10. Can I expect a similar benefit in my setting?
11. Are the expected benefits worth the associated costs?

Table 4: Steps to assess a new medical technology (adapted from Keenan et al. 1999)

At the outset the main aim in the designing of any new device is to ensure that it performs the function it was set out to. Thereafter follows patient safety, usability and so on. As already examined, machine malfunctions occur, errors can occur as a consequence of these malfunctions, often errors are blamed on the user. In intensive

care, where a high number of users will be interacting with the technology, the design of technology merits careful attention and should help minimise human errors.

Notwithstanding the importance of these consideration Curtin (1990) says we must also remember to soften technology with human consciousness to integrate it into nursing practice, "we need conscience to temper our technology – to add that touch which will make it strong and effective in producing human well-being"(p8). Suggesting, similar to Pope (1974), nurses should use technology as their aid, to benefit them *and* their patients. Clearly from the earlier discussions this is an area that technology is accused of overshadowing and were anxieties lay. Fundamentally, technology should aid and not hinder. In addition to improving patient outcomes it should be used to increase nurses' ability to perform direct patient care; improving patient care. Sipe et al (2003) propose "Technology should support patient therapies, reduce stress, and promote a holistic approach to healing, as well as entertain" (pS36). It seems unlikely that entertain is being used in the context as to amuse the nurse, make them laugh and even more unlikely that it was to divert their attention (considering the negativity surrounding this issue). It is more likely that 'entertains' means, as reiterated throughout the literature, it should engage the nurses, be interesting, user friendly (something they can get to grips with easily) and support their nursing practice, not something they feel frustrated by.

Patient benefit is the true end point aimed for in the evaluation of technologies, and although a positive 'outcome' is a good end point it should not be the focus, improving a patients care that will in turn improve their outcome is a much more humanistic outlook and prevents patients being reduced to numbers; maintaining individuality.

3.8.2 Technology errors and human errors

However, despite this ideal errors in healthcare are inevitable. The feelings of ambivalence surrounding ICU technology have been illustrated. The nurses acknowledge that technology is not infallible and still draw upon, and demonstrate use of their clinical experience to make decisions regarding patient care in addition to the information provided by the ICU technology. It would appear that more technological monitoring of patients does not necessarily equate to better patient care

or patient outcomes. Technological information is not only dependent upon correct interpretation and training by its users but this delivery of information is often preceded by invasive and high risk procedures, and ultimately will at some point malfunction. The recognition of this malfunction is obviously critical to the patients' safety.

Technology errors

Errors in healthcare are acknowledged and documented. Technology is one such source of error. This is despite attempts to design systems that reflect human behaviours and encourage effective human use (Gawron et al. 2006). This according to Fairbanks and Caplan (2004) is because usability of technology, although recognised as significant for patient safety, is still "rarely given much attention in the purchasing process" (p583) and that "some companies consider human factors to be an expensive luxury" (p583). They conclude that essentially many of the adverse events, often assumed as a result of human error, actually occur because of poor technology design, and ultimately could be avoided if usability was tested (Fairbanks & Caplan 2004). Gardner and Huff (1992), emphasise the importance of testing usability to ensure effective and correct use of information delivered by technology, they reported that data from bedside monitoring of ICU patients was to inform doctors decision making between 13-22%. This equated to the same use of observations, 21%. Staggers (2003) argues that the available clinical information systems "provide too many parameters with little provision for displaying critical data in a context that allows clinicians to make safe, fast decisions" (p310), and stresses the need for better designed ICU systems to help prevent errors.

Human errors

However, humans do and will make errors. An American report, entitled 'To err is human: a safer health system'(Institute of Medicine 1999), highlighted that extremely high numbers of patients in healthcare die as a result of medical and healthcare management errors; 44,000-98000 patients. Leape (1994) cites one ICU study's results, presented at an annual meeting of human factors, which reported 1.7 errors per ICU patient per day occurring. Although this would equate to performing at a

level of 99% proficiency, he compares it to other large industries such as aviation and nuclear power when this would be unacceptable. Cooper and colleagues (2002) exploration of mishaps in anaesthesia reported that human errors accounted for 82% of incidents.

Technology is recognised as promoting patient safety (Institute of Medicine 2001) and perceived by nurses as increasing patient safety (Kiekkas et al. 2006). Therefore a lack of knowledge and education surrounding technology certainly contributes to human errors occurring (Thornby 2011). Arguably it is difficult to maintain high levels of education and thereafter competence in technology's workings, due to the rate of technological advancements coupled with inadequate staffing levels. Yet, competence and familiarity are important concepts to ensure patient safety and minimise errors occurring. Furthermore, preserving patient safety is not only a 'need' as the nurses interviewed reveal (see p186) but is also a professional responsibility to prevent harm (Nursing and Midwifery Council 2008;Thornby 2011). Although we can never eliminate human error it is suggested we can reduce the known sources of the errors.

It has been proposed that healthcare should take lessons from other larger industries such as, aviation where human error has been markedly reduced. Leape (1994) suggests some reasons as to why errors in healthcare continue. It could be that they are not reported in the same way in which an aviation disaster would be or that the way in which healthcare handles the errors is poor. There is a stigma in medicine that an error equates to poor care and essentially negligence; this attitude fosters a dishonest approach to errors and encourages people to shift the blame of errors to others around them (Leape 1994). What is required is a more team approach in managing errors, "From an emotional standpoint, they need the support and understanding of their colleagues and patients when they make mistakes" (p1852), something that is still not being achieved in current healthcare. Systems need to be in place to make it more difficult for healthcare staff from making errors but also recognise they will, and to have a plan for when they do. Some aviation lessons such as the use of checklists and standards in healthcare have been adopted in healthcare practices, albeit with some reservations in their potential to jeopardise the use of clinical

judgement. The technologies used in aviation have built in buffers to absorb the errors that inevitably will occur, something perhaps that is still lacking in current medical technology. Healthcare technologies are still developed, according to Leape (1994), relying "on individuals not to make errors rather than to assume they will" (p1855). It is interesting to see that even two decades ago that Leape (1994) predicted errors will not be successful reduced unless individual blame is removed

"Physicians and nurses need to accept the notion that error is an inevitable accompaniment of the human condition, even among conscientious professionals with high standards. Errors must be accepted as evidence of systems flaws not character flaws. Until and unless that happens, it is unlikely that any substantial progress will be made in reducing medical errors" (p1857).

Although human error and patient safety is a healthcare priority the researcher is at pains to determine whether a significant improvement, as Leape suggested is required, has been achieved yet.

3.9 Technology and human hybridity

Brown (1991) and others clearly worry that an over dependency on technology could occur, wherein nurses ignore their own clinical judgement particularly when "their findings are incongruent with the machines' results" (p243). This fear could be diminished if the recent work by scientists investigating a new 'hybrid' system examining real-time interactions between humans and machines comes to apparition (Science Daily 2009). Their goal is to make a friendlier union between man and machine, by developing technology that can be taught and influenced by the human operator and vice versa. The technology will "mirror the equations of motion of the human neurobehavioural system"; it has been developed on the pretence that humans gather skills from watching and interacting with each other and the same therefore can be done with technological machines (Science Daily 2009). Almerud (2007) believes that nowadays technological tools in some way replace human activities, stating that human knowing has thus been transferred to the machines. Sandelowski (1999) states that "we depend on computers that seem to think like us" (p199). The concept of technology thinking and behaving as a human would is a frightening concept, especially as traditionally there are very clear lines between 'self' and other

objects. Nissenbaum (2001), a philosopher, debates whether technology can replace humans and even embody values. She states that

"Values affect the shape of technologies. Briefly, the values that systems and devices embody are not simply a function of their objective shapes. We must also study the complex interplay between the system or device, those who built it, what they had in mind, its conditions of use, natural, cultural, social, and political context in which it is embedded – for all these factors may feature in an account of the values embodied in it" (p120).

However, Haraway (1991) alludes to ways in which it would definitely have its advantages; it would disperse the nurse/technology divide that has been long debated and unresolved. Furthermore, it could potentially remove the issue of 'error' inherently entangled in the use of technology.

3.10 Summary of chapter

Technologies are being continually developed hoping to improve patient care by increasing the rate in which diagnoses can be made, and the speed information can be gathered to inform and influence clinicians' decisions. The researcher has considered both the philosophical and contextual arguments for technology and nursing, an awareness of both essential to develop understanding of the issues. Highlighting the useful, yet easily dismissed, philosophical groundings of technology, it is therefore equally important to consider the importance and influence of technology's essence as it is the physical attributes of pieces of technology. However, arguably it is technology's physical attributes that remain the focus and are seen as the antithesis of nursing by some authors who view it as dehumanising and distracting (e.g. machine alarms) the nurses from their role to care for patients. However, the essence of technology may possess more power overshadowing the *real* uses of technology by its promises and abilities. Therefore, the debate continues whether technology can truly be seen as working in partnership with the ICU nurses.

It is evident that it is very much a case of 'can't live with it, can't live without it'. Ultimately, lives are saved in this technological era than would have been possible even a decade ago and hence it would be difficult to withdraw certain technologies ethically. Nurses report ambivalent feelings about technology; weighing up its

advantages and disadvantages. Despite the negative connotations surrounding its use in ICU the nurse appear to view it as adjunct to their classical nursing duties, something they use with the patient not as a separate entity; something which essentially enhances their knowing of a patient. The infallibility of ICU technologies is well recognised and the association of technology errors in healthcare. However, healthcare organisations still appear to be failing to reduce the number of errors, technology and human, or change working systems to accommodate and manage inevitable errors. Technological hybridity is a novel idea in development. It currently appears an implausible idea, yet reflection upon the technological advancements in recent years and the pace at which they advance lends itself to such inconceivable developments actually being plausible and could arguably provide benefits to its users and the healthcare system.

Chapter 4: Sedation and the Intensive Care Unit

4.1 Overview of chapter

This chapter reviews the literature around sedation practices in intensive care units (ICU). It will particularly focus around the current changes in ICU sedation practice and will explore the evidence that is driving them. It will examine the implementation of sedation holds and the national patient safety initiative driving them. It hopes to offer the reader a concise overview of sedation practice in ICUs today and illustrate the challenges and benefits they offer healthcare staff and patients.

4.2 Sedation uncovered

Sedatives are one of many medications administered in ICU. They are often used in conjunction with analgesics[6] and, although less frequently nowadays, with paralysing agents (muscle relaxants)[7]. Analgesics are often used in combination with sedatives to treat pain and to assist patients' to tolerate their endotracheal tube used to facilitate mechanical ventilation, something that sedation cannot do. Benzodiazepines, to ease symptoms of anxiety, are also frequently used. However, they need to be used with caution as they are known both to compound existing confusion coupled and raise issues surrounding dependency. Prolonged use of paralysing agents in patients can lead to long term neuromuscular complications and, as such, are now only recommended when deemed clinically necessary (Rowe & Fletcher 2008). With modern ventilatory modes, most patients will tolerate mechanical ventilation without neuromuscular paralysis. It has been suggested that paralysing agents should only be given when a patient is heavily sedated, "generally to the point of unconsciousness"

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[6] Analgesics (Opioids): The most common indication for the therapeutic use of opioids is to provide analgesia. They are also able to elevate mood and suppress the cough reflex. The ability to suppress the cough reflex is useful in patients who need to tolerate a tracheal tube (in situ during mechanical ventilation) ((Paw & Park 2000).

[7] Paralysing agents (muscle relaxants): These are neither analgesics nor sedative agents and, therefore, should not be used without ensuring that the patient is both pain-free and unaware. Their use has declined since the introduction of synchronised modes of ventilation and more sophisticated electronic control mechanisms. Their use should be restricted to certain specific indications: tracheal Intubation, facilitation of procedures, where a patient's oxygenation is critical and there is a risk of barotraumas, management of neurological or head injured patients where if they coughed or strained themselves on the tracheal tube they may cause more damage to their brains (Paw & Park 2000).

(Honiden & Speigel 2010 p199). However, there is anticipation in the critical care arena that the use of neuromuscular agents may start to increase again, particularly for patients with Acute Respiratory Distress Syndrome (ARDS) following the findings of Papazian and colleagues (2010). Their study reported reduced mortality rates in those patients who received paralysing agents early in the diagnosis of ARDS, which they hypothesised as being the protection this offered to the patients' lungs. They also reported that the use of paralysing agents did not equate to more sedatives being administered.

Sedation remains commonplace in ICU, with 50-70% of patients receiving a form of sedation or analgesic, continuously or intermittently, at some point during their stay in ICU (Barrientos-Vega et al. 1997;Treggeari-Venzi et al. 1996). ICU is a frightening and stressful experience for patients, where often to maintain life and or enable recovery, the presence of an endotracheal tube (ETT) and mechanical ventilation is a necessity. In order for mechanical ventilation coupled with other therapeutic interventions to take place effectively in ICU and to reduce patient anxiety and ensure comfort, patients often receive sedation (Jacobi et al. 2002;Weinert, Chlan, & Gross 2001). Sedatives are normally prescribed by a doctor and are often administered by a nurse, and "often with a wide margin of discretion" (Weinert, Chlan & Gross 2001 p157). This view is shared by Pinder and Christensen (2008), who suggest that there are considerable inconsistencies in the delivery of sedation.

The main goal of sedation, apart from facilitating necessary clinical and therapeutic interventions, is to ensure patient comfort and safety, its use in this respect has come under close scrutiny in recent years. Traditionally sedatives were "generally used to keep patients motionless" (Wunsch & Kress 2009 p542), heavy sedation was very much seen as a necessity of ICU care for *all* patients (Rowe & Fletcher 2008). The effect of prolonged, heavy sedation has now been extensively studied. It is associated with increased time mechanically ventilated and longer ICU stays for patients (Kollef et al. 1998). Moreover, there are further implications as a result of these outcomes such as: increased incidence of ventilator associated pneumonia (VAP), decreased mobility and increased healthcare costs longer term (De Jonghe et

al. 2005;Ostermann et al. 2000). A number of randomised controlled trials have established that those patients who receive less sedation and undergo a sedation 'hold', wherein a sedative infusion will be halted in order to encourage a patient to waken or become rousable, demonstrate positive patient outcomes. These outcomes include a reduced requirement for mechanical ventilation, reduced length of ICU and hospital stay, and decreased morbidity and mortality (Girard et al.2008;Kress et al.2000) – sedation holds are examined in detail later (see p64). Furthermore, there is growing evidence in support of ensuring that patients now have some memory of ICU; experienced prolonged periods of lost memory or unformed memory are associated with higher levels of cognitive disturbance and post-traumatic stress (Jones et al.2001;Jones et al. 2004;Jones et al.2007;Kress et al.2003). The culture of sedation use is undergoing a transformation; viewing it more perhaps as a 'necessary evil' in ICU practice.

4.2.1 The cost of sedation

Sedative drugs are a large component of an ICU's budget. The cost of sedation is difficult to report, mainly due to the inaccuracies in the 'top down' approach usually adopted, it is estimated on direct costs incurred as either part of the ICU or pharmacy budget. The problem with a 'top down' approach is that it does not always accurately reflect how much sedation was *actually* used, as often prescriptions will be changed or sedation infusions stopped, in both cases leading to sedative infusions being destroyed and not received by patients. A small audit performed in a single centre adopted a 'bottom up' approach to explore the cost of sedation; prospectively collecting data from nursing charts and prescriptions simultaneously, they also calculated the 'top down' costs for the same period. They reported that there were, unsurprisingly perhaps, stark differences between the 'bottom up' costs and 'top down' cost; the 'bottom up' costs were only 81% of the 'top down' costs. They also calculated that the median costs of sedatives, analgesics and paralysing agents only accounted for 1% of the ICU budget; equating to costs of £9.30 per patient day (Al-Haddad, Hayward, & Walsh 2004).

These raw sedation costs are ultimately affected by sedation practices in general, the use of less sedation or even simply the more appropriate use of sedation as per the

research based evidence. This is supported by a number of studies which demonstrated that use of research based sedation protocols equated to reductions in crude sedation costs for their ICU (Costa et al. 1994;Maclaren et al. 2000;Mascia, Koch, & Medicis 2000). Furthermore, a number of commonly used sedative agents, such as propofol, are now available 'off-patent'[8] which lowers their cost in comparison to newer 'on-label' sedatives, such as dexmedetomidine. This has a potential high impact on costs given the high proportion of patients who will receive sedatives during their ICU admission.

4.3 Assessment of sedation

Sedation is managed by both doctors and nurses in ICU. Nurses are present at a patient's bedside more than doctors and hence it is argued they are well placed to perform sedation assessment and management (Walker & Gillien 2006). In view of this "...critical care nurses...should have a sound knowledge of sedatives – in particular, how they work and what adverse effects they can produce" (Pun & Dunn 2007a p40). Pain, agitation, anxiety and delirium are all manifestations of ICU; they have similar symptoms but have different causes and as such require different treatments and reliable tools to assess for each (Pun & Dunn 2007a). Anxiety and agitation are primarily treated with sedation. However, it is recommended that the clinician only administer sedation as a treatment once they have assured patients' have received adequate analgesia; to treat pain that could be manifesting as anxiety and agitation. They must also consider delirium as a source of agitation and anxiety and take action to reverse any physiological causes of it (Society of Critical Care Medicine 2002 Guidelines cited in Jacobi et al. 2002).

4.3.1 Sedation Scales

At present, guidelines suggest that sedation should be assessed and managed using sedation scales, ideally linked to protocols that determine the titration of drugs, sedation reduction and/or withdrawal (De Jonghe et al. 2000). Clinical sedation

[8] Off-patent: The practice of prescribing medication for an unapproved indication or in an unapproved age group, unapproved dose or unapproved form of administration. This practice is permitted in the United Kingdom. According to the British General Medical Council, off-patent prescriptions must better serve patient needs than alternatives and must be supported by evidence or experience to demonstrate safety and efficacy (General Medical Council 2008).

scales are based on patient responses to simple clinical stimuli which allow their sedation status to be evaluated and documented. Most scales use a sequential series of stimuli starting with visual observation, progressing through response to voice, and subsequently mechanical and/or painful stimuli (Eappen et al. 1999;Ely et al. 2003;Ramsay et al. 1974). There are vast numbers of sedation scales available for use in clinical practice, including adaptations of some scales. However, currently there is no universally accepted standard. A recent systematic review reported thirteen different sedation scales existing and being utilised across ICU practice (Jackson et al. 2009).

Commonly used scales in practice today are the Ramsay scale (Ramsay et al. 1974), the Sedation Agitation Scale (SAS) (Riker, Pickard, & Fraser 1999), the Richmond Agitation-Sedation Scale (RASS) (Sessler et al. 2002). Less commonly used, are the Adaptation to the Intensive Care Environment instrument (ATICE) (DeJonghe et al. 2000), and the Minnesota Sedation Assessment Tool (MSAT) (Weinert & McFarlane 2004) and the Motor Activity Assessment Scale (MAAS) (Devlin et al. 1999). This list is not exhaustive and Jackson and colleagues (2009) noted a number of less known scales being used in practice too, examples of the sedation scales named are illustrated below:

Ramsay Sedation Scale:

Score	**Response**
1	Patient is anxious and agitated or restless, or both
2	Patient is cooperative, orientated and tranquil
3	Patient responds to commands only
4	Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
5	Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
6	Patient exhibits no response

Sedation-Agitation Scale (SAS):

Score	**Term**	**Descriptor**
7	Dangerous Agitation	Pulling at ET tube, trying to remove catheters, climbing over bedrail, striking at staff, thrashing side to side
6	Very Agitated	Requiring restraint and frequent verbal reminding of limits, biting ETT
5	Agitated	Anxious or physically agitated, calms to verbal instructions
4	Calm and cooperative	Calm, easily rousable, follows commands
3	Sedated	Difficult to arouse but wakens to verbal stimuli or gentle shaking, follows simple commands but drifts off again
2	Very Sedated	Arouses to physical stimuli but does not communicate or follow commands, may move spontaneously
1	Unrousable	Minimal or no response to noxious stimuli, does not communicate or follow commands

Richmond Agitation Sedation Scale (RASS):

Score	Term	Description
+4	Combative	Overtly combative or violent, immediate danger to staff
+3	Very agitated	Pulls on or removes tubes or catheters or has aggressive behaviour toward staff
+2	Agitated	Frequent nonpurposeful movement or patient ventilator dyssynchrony
+1	Restless	Anxious or apprehensive but movements not aggressive or vigorous
0	Alert and calm	
-1	Drowsy	Not fully alert, but has sustained(more than 10 seconds) awakening, with eye contact/eye opening to voice
-2	Light sedation	Briefly (less than 10 seconds)awakens with eye contact to voice

-3	Moderate sedation	Any movement (but no eye contact) to voice
-4	Deep sedation	No response to voice, but any movement to physical stimulation
-5	Unrousable	No response to voice or physical stimulation

Adaptation to the Intensive Care Environment instrument (ATICE):

Consciousness domain graded 0-5		
Awakeness	**Comprehension, sum of 1 point responses**	
Eyes close, no mimic 0	Open/close eyes 1	
Eyes closed, only face mimic after strong painful stimulation 1	Open your mouth 1	
Eyes open after strong painful stimulation 2	Look at me 1	
Eyes open after light painful stimulation 3	Nod yes with head 1	
Eyes open after verbal order 4	Close eyes and open mouth 1	
Tolerance domain		
Calmness, graded 0-3	**Ventilator synchrony, sum of 1 point elements**	**Face relaxation, graded 0-3**
Life-threatening agitation 0	No blockade of the inspiratory phase of ventilation 1	Permanent grimacing 0
Agitation, does not respond to verbal order 1	No respiratory rate >30 1	Severe provoked grimacing 1
Agitation, responds to verbal order 2	No cough 1	Moderate provoked grimacing 2
Calm 3	No use of accessory muscles 1	Released face 3

Minnesota Sedation Assessment Tool (MSAT):

Procedure for Scoring the MSAT
1. Record the highest level of un-stimulated spontaneous motor activity observed in the last 10 mins
2. Walk to the right shoulder and observe eye opening and/or tracking
3. If no eye opening, call first name and "open your eyes!"
4. If no eye opening yet, shake right shoulder firmly, call first name and "open your eyes!"
5. Choose the arousal scale category appropriate for the patient's response to procedures 2 to 4
6. Judge the current quality of the sedation therapy as "adequate", "oversedated" or "undersedated". Use any clinical information available to you in addition to the scale levels
Motor Activity Scale
4. Movement of central muscle group (back or abdominal muscles)
3. Movement of proximal limbs (hip or shoulder)
2. Movement of distal limbs or head and neck muscles
1. No spontaneous movement
Note: disregard respiratory efforts, cough, swallowing, eye movement, or isolated tiny muscle contractions
Arousal scale
6. Eyes open spontaneously with tracking
5.Eyes open spontaneously but not tracking
4.Eyes closed but open to sound of voice
3.Eyes closed but open to shoulder shake plus sound of voice
2.Eyes stay closed, but other patient movement observed in response to stimulation
1.Eyes stay closed and no patient movement is observed in response to stimulation

Motor Activity Assessment Scale (MAAS):

Score	Description	Definition
0	Unresponsive	Does not move with noxious stimulus*
1	Responsive to noxious stimuli	Opens eyes OR raises eyebrows OR turns head toward stimulus OR moves limbs with noxious stimulus
2	Responsive to touch or name	Opens eyes OR raises eyebrows OR turns head toward stimulus OR moves limbs when touched or name is loudly spoken
3	Calm and cooperative	No external stimulus is required to elicit movement AND patient is adjusting sheets or clothing purposefully and follows commands
4	Restless and cooperative	No external stimulus is required to elicit movement AND patient is picking at sheets or tubes OR uncovering self and follows commands
5	Agitated	No external stimulus is required to elicit movement AND attempting to sit up OR moves limbs out of bed AND does not consistently follow commands (e.g. will lie down when asked but soon reverts back to attempts to sit up or move limb out of bed)
6	Dangerously agitated, uncooperative	No external stimulus is required to elicit movement AND patient is pulling at tubes or catheters OR thrashing side to side OR striking at staff OR trying to climb out of bed AND does not calm down when asked
*Noxious stimulus, suctioning OR 5 secs. Of vigorous orbital, sterna or nail bed pressure		

The ideal sedation scale has validity, especially for discrete sedation states, is easy to administer, and importantly has high intra and inter-rater reliability (Sessler 2004). A number of sedation scales have had elements of their assessment tool criticised in terms of its subjectivity and interpretation. For example, the Ramsay scale fails to clearly distinguish between levels of agitation, the SAS applies words open to interpretation by its users such as ‘frequent’ and ‘stronger’ and the ATICE scale uses a twenty- point score range. More recently Mirski and colleagues (2010), acknowledging the nurses role in the assessment of sedation, offered another scale, the ‘Nursing Instrument for the Communication of Sedation’ (NICS). They argued that currently the sedation scores available only offer a descriptor of a patient’s

sedation level and do not offer any way to improve patients' therapeutics or safety; communication between nurses and doctors. It works on the premise that in addition to applying a score it also encouraged action to be taken at any level other than when optimal was scored (score 0). A score of either -3 or +3 instructed the nursed that immediate attention was required, a score of -2 to +2 suggested although nonthreatening condition acute attention was required and if scoring -1 to +1 the nurses was reassured that she should watch and wait. The conclusions drawn were that the nurses asserted a preference to its use over other scales and that it offered "effective and interactive management of sedation" (Mirski et al. 2010 p1674). Its use in clinical practice requires to be more widely validated.

It is important that the validity and reliability of scales used in healthcare, not exclusively sedation scales, is proven. Sedation scales must have the "ability to document agitation and distress symptoms (anxiety, delirium and pain), as well as to identify the end-points of each level of sedation that each sedative agent can achieve" (Carrasco 2000 p218). It must also demonstrate repeatable results between different users, and be easy to learn and operate in 'real' practice (Carrasco 2000). Currently, many of the scales remain invalidated for use in ICU patients (Carrasco 2000). However, the most widely validated tool, with publications showing high intra and inter-rater reliability, is the RASS score (Ely et al. 2003). Despite this evidence, it has not been widely adopted and the subjectivity of sedation scales is repeatedly highlighted as a significant concern (Rowe & Fletcher 2008). Inarguably, there will be patients in whom the sedation scales fail and inevitably leave them suffering the consequences of either over sedation or under sedation (Arbour et al. 2009). Due to the diverse use of sedation scales in ICU practice the exploration and comparison of study findings is more difficult. Nevertheless, currently sedation scales remain the method of assessment, supported by the largest evidence base, particularly over the use of clinical judgement alone. An important factor that is overlooked in current sedation scales is that of delirium, a brain dysfunction common in ICU, which can modify the relationship between the stimulus and the response in the sedation score assessment. Delirium is explored later in this chapter.

One caveat of sedation scales worth considering is the lack of guidance surrounding how often a sedation assessment should actually be performed. The guidelines vary; some simply suggesting sedation assessment should be a priority, whilst others suggested it should be performed daily, twice a day or just 'frequently' (see Appendix 5).

Glasgow Coma Scale

The Glasgow Coma Scale (GCS) is still used in clinical practice, and reported as a scale used to assess ICU patients sedation status (Jackson et al. 2009). This is despite it being long evaluated as a poor marker of neurological status in sedated patients and therefore should not be actively used as a tool to assess sedation status (Price, Miller, & deScossa 2000).

4.3.2 Sedation protocols

The use of sedation protocols coupled with sedation scales are proven to be beneficial for patients' outcomes. Brook and colleagues (1999) demonstrated that patients who had their sedation managed with a protocol and nurse led decision making versus clinician orders had reduced need for ventilation and both a reduction in ICU and hospital stay. Another study, from a surgical ICU, reported a reduction of 2.1 days of mechanical ventilation for patients whom had their sedation managed using a sedation scale and sedation protocol (Brattebø et al. 2002). Two further studies which explored the impact of a sedation protocol versus doctors' orders (Quenot et al. 2007; DeJonghe et al. 2005) also demonstrated patient benefits; reduction in ventilator associated pneumonia and mechanical ventilation, and earlier wakening and reduced mechanical ventilation respectively. In contrast, Adam and colleagues (2006) showed no benefit of a sedation protocol to their group of cardiac patients' length of stay, despite a 43% reduction in sedation costs as a consequence of the protocol's implementation. There is some concern that using protocols to drive (down) sedation may result in more adverse events. Adverse events in critical care often refer to unplanned extubations or invasive line removal. There is varying evidence supporting these fears, Girard and colleagues (2008) reported an excess of 10% in his study. Interestingly though, amongst those who did self-extubate, very few required reintubating, indicating that perhaps these patients were actually ready

for extubation? Whereas, although many other studies have reported unplanned extubations (Brattebø et al. 2002;Chanques et al. 2006;Quentot et al. 2007), no statistical differences were found between the control and intervention groups. Therefore, current evidence would suggest that the use of sedation protocols and a more wakeful ICU population does not result in an excess of adverse events.

4.3.3 Practice variations

Despite the vast number of available sedation scales and recommendations for their use in practice, it remains varied. A Canadian survey of intensivists' sedation practice reported that only 49% used sedation scales and 29% used protocols to direct their practice (Mehta et al. 2006). Another observational study, undertaken in French ICUs in 2004, revealed that only 40% of patients' sedation were assessed using a sedation scale and only 36% utilised a sedation protocol (Payen et al. 2007). More recently, a national survey was undertaken in the United Kingdom; responses were received from two thirds of the ICUs. It reported higher rates of sedation scale and protocol use; 88% and 80% respectively (Reschreiter, Maiden, & Kaplia 2008). This may be an indication that practice is improving and that sedation is perhaps receiving the attention it requires. However, surveys are often found to have poor response rates and respondents will report what they perceive they do in practice rather than accurately reflecting what actually occurs; reporter bias.

4.3.4 Clinical Judgement

An American study, using a self-reporting scale, explored factors that influenced nurses' sedation practices, they reported that the nurses' attitudes accounted for a third of the variance found in the intention to sedate mechanically ventilated patients (Guttormson et al. 2010). Furthermore, they highlighted that the nurses held beliefs that sedation should be used to reduce patients' recall of their stay in ICU, particularly mechanical ventilation, which they perceived as being uncomfortable for the patient. They reported that 15% of their respondents actually felt that "no response to noxious stimuli or no spontaneous movement was an appropriate sedation level for patients" (Guttormson et al. 2010 p49). This is a stark contrast to the current guidance around sedation management (Intensive Care Society 2007). Weinert and Calvin's (2007) study also illustrated the problems using clinical judgement to assess

patients need for sedation. They reported a marked discrepancy in the 'personal judgement' of over sedation, with only <3% of cases deemed over sedated, versus the use of a structured sedation assessment, wherein patients were noted to be non-rousable in 32% of cases and motionless in 21% of cases. It is proposed that nurses have a tendency to judge the more deeply sedated patients as being 'optimally' sedated. This also raises the question of a nurse's experience and the influence on their sedation practice. Weir and O'Neill (2008) reported that the nurses whom they interviewed tended to be of the opinion that "lack of clinical experience among nurses could at times lead to inadvertently over-sedating of patients" (p191).

4.3.5 Sedation Monitors

There are currently no sedation monitoring devices in widespread use in ICUs, and certainly no device has been subjected to rigorous controlled trials. There are two devices currently available, which are linked with measuring depth of sedation; both of which licensed and used primarily in anaesthesia. These are the Bispectral Index (BIS) and Entropy, likened to 'black box' devices; a device in which its inner workings are not understood or accessible to its user (Walsh, Ramsay, & Kinnunen 2004).

4.3.5.1 Bispectral Index (BIS)

The usefulness and appropriateness of BIS has been long debated since its development in the 1990's. Essentially, BIS was developed to monitor the effects of anaesthetic agents and other drugs on the brain during surgical procedures. Although it has since been studied for its use in intensive care (ICU) patients and does have a license as an ICU monitor, its use does not appear widespread or consistent in clinical practice. The results of these studies vary in their positivity of BIS's application in ICU; some praised its use in addition to sedation assessments (Kaplan & Bailey 2000;Mondello et al. 2002;Simmons et al. 1999), others reported that it was not helpful for the ICU patient (Chisholm et al. 2006;Frenzel et al. 2002;LeBlanc et al. 2005;Nasraway et al. 2002;Tonner et al. 2005;Viven et al. 2003;Weatherburn, Endacott, & Tynan 2007), one indicating more sedation was actually administered when it was used (Weatherburn et al. 2007) and others concluded more data was required (Arbour 2004;Bader & Arbour 2005). There are a number of factors that

potentially affect BIS readings such as, sleep, temperature, age and some drugs used in ICU (Arbour et al. 2009) but first and foremost, and perhaps more prominent, the goals of ICU sedation and anaesthesia sedation are almost at polar opposites. Principally, in anaesthesia, the goal is to keep patients deeply sedated, so they do not move. In contrast, in ICU evidence clearly suggests lighter sedation is more beneficial, patient movement is common and encouraged as part of nursing practice.

4.3.5.2 Entropy monitor

Entropy was developed (by GE Healthcare) and licensed as a means of monitoring depth of anaesthesia and has been compared favourably with BIS (Davidson et al. 2005;Takamatsu, Ozaki, & Kazama 2006). To investigate it's suitably for ICU use, studies were carried out comparing it with clinical sedation states. The outcome, as with BIS, demonstrated that the physical movements' common amongst ICU patients greatly confounded the results. Hence, Entropy monitoring has not been promoted or marketed for use in ICUs.

Many of the monitor studies only examined association between clinical sedation scales and the monitors. The consequence of this is that the clinical usefulness of the monitors has not been validated. This validation can only be achieved if assessment of their utilisation by nurses/medical staff is performed, for example do they add anything to their practice. Such studies need to explore how/if the monitors altered decisions/clinical practice, and/or how using the monitor changes outcomes. Such outcomes could be clinical, patient centered, economic or a combination of effects.

4.3.5.3 Responsiveness monitor

In response to the typical ICU patient, wakeful and moving, and acknowledging the need to assess clinical usefulness, that failed to be examined for both BIS and Entropy, *GE Healthcare*, in collaboration with the Edinburgh Critical Care Research Group (ECCRG)has developed a monitoring device based on responsiveness of the facial electromyograph (fEMG). In BIS fEMG is a confounder to the EEG (Electroencephalography) measurement as it interferes with the EEG signals. However, in responsiveness monitoring the measurement is based upon fEMG properties. fEMG is measured through the placement of electrodes on a patients'

forehead, the electrodes are sensitive to muscle activity (i.e. grimacing, eye twitching) some of which will be so slight that it may unnoticeable to clinical staff, the appearance of fEMG activity indicates a patient response to a stimulus (Viertio-Oja et al. 2004). The responsiveness algorithm calculates a single number (Responsiveness Index (RI)) in the range 0-100 which describes the amount of fEMG responses the patient exhibits in relation to both external (lights, noise, care procedures) and internal (pain, anxiety) stimuli. An RI of 0 is intended to indicate a completely non-responsive patient, while an RI of 100 is intended to indicate a fully responsive patient. As the amount of external stimulation during intensive care management varies over time with an unpredictable pattern, and the nature, intensity and source of stimulation also vary the 'Responsiveness' value is intended to be a dynamic indication of the interaction between the current level of stimulation, the sedation and analgesic state of the patient, and incorporate illness related factors such as encephalopathy that could modify the relation between stimulation and response in individual patients. The device generates a responsiveness number based on the facial EMG over the previous 60 minutes (weighted to most recent data). The monitor has been further developed to create a "traffic light" system. In this system, red was intended to correspond to the least responsive patient state either as a result of excessive sedation or receiving minimal stimulation. Green was intended to correspond to awake patients, or patients exhibiting frequent motor responses to ongoing treatments (including agitation). The amber category was designed as an intermediate state. With this concept red and amber RI categories are intended to alert clinical staff to a potentially over sedated state, prompting a review of sedation management. Completed small studies suggest that the device is a valid measure of the level of consciousness in response to ongoing treatment for sedated critically ill patients. A prospective single centre unblinded trial compared sedation management using a protocol based on responsiveness, as measured by the monitor; with standard sedation management (the RASS score). The hypothesis being that discrete measures of responsiveness will improve a range of patient-based and economic outcomes, including the duration of mechanical ventilation and duration of induced coma in the ICU. Despite being a pilot study the results have demonstrated strong signals

supporting the hypothesis. A more comprehensive summary of the study details and interface examples of the monitor can be found as Appendix 9 and 10.

4.4 Optimal sedation

There has been lots of reference to achievement of 'optimal' sedation states in the discussion of sedation scales and protocols. Optimal states are proposed as those when the patient is calm, easily rousable, whilst comfortable; ensuring patients are not unnecessarily under or over sedated (Pun & Dunn 2007a). The consensus around what actually constitutes 'optimal' is noted to be variable in ICU practice, it appears that 'optimal' varies between patients and can be dependent upon their medical and treatment needs. 'Optimal' sedation is viewed as a very unique and individual assessment (Jackson et al. 2009). Therefore, at the outset, the definition of optimal or adequate sedation is problematic.

A fundamental finding is that many of the guidelines pertaining to delivering optimal sedation originate from the United States (US) (American College of Critical Care Medicine in the Society of Critical Care Medicine 2002;Australian and New Zealand College of Anaesthesiologists 2008;Feeley & Gardner 2006;Hawryluck et al. 2002;Jacobi, Fraser, Coursin, Riker, Fontaine, Wittbrodt, Chalfin, Mascia, Bejerke, & Coplin 2002;Knape et al. 2007;Shah 2000;Shapiro et al. 2007;University of Pennsylvania Medical Center 2003;University of Virginia Health System 2005). This is a noteworthy observation as ICU clinical practice differs from the US. In the US patients are often nursed in single rooms and at a 1:3 nurse to patient ratio; both practices that are not standard in British ICUs. Furthermore, a majority of US ICUs are not closed units, wherein patient care is solely managed by intensivists as is the case in most UK ICUs; this ultimately has consequences for the way in which care/treatments are managed.

Moreover, the sedation guidelines invariably differ in their recommendation of what is an appropriate 'optimal' sedation level. Shapiro and colleagues (2007) recommend a RASS score of 0 to -2 but another guideline suggests clinicians should aim for a RASS of -3 (University of Pennsylvania Medical Center 2003). To add to the confusion, Knape and colleagues (2007) refer to the Ramsay scale, and suggest

aiming for a score of 2 *or* 3. Ultimately, the wealth of sedation scales available complicates the pursuit of optimal, as does the diverse recommendations. However, a commonality was noted amongst the guidelines offered; that the practitioner themselves should decide the sedation target dependent on their patients needs. Reflecting on the early discussions surrounding the use of clinical judgment though this may be a far from ideal approach to practice. Despite this, the importance of clinical judgement and experience cannot and should not be overlooked (Carper 1978;Croskerry 2009;Department of Health 1999;Department of Health 2000b).

Sub optimal levels affect clinical outcomes for patients and also economic outcomes for health care organisations (Berenholtz et al. 2002;Brattebø et al. 2002;Chanques et al. 2006; Gehlbach & Kress 2002). This stresses the importance of achieving 'optimal' sedation, despite its remaining an ambiguous area in practice. If 'optimal' sedation is not achieved a patient will either be over sedated or under sedated; both detrimental to their well-being as well has impacting upon the healthcare organisation. As Siegel (2003) suggests the onus lies with "Conscientious clinicians [who] must strike a balance between treating agitation and avoiding oversedation" (p713). Dunn and Baker (2011) suggest that critical care nurses "must walk a tightrope, ensuring patients get the precise amount of sedation they need" (p12).

4.5 Over sedation

Historically, in retrospect, it is now recognised that ICU sedation has been poorly managed and has not necessarily received the attention it merits. Peruzzi and Hurt (2005) suggest that provision of appropriate sedation is often overlooked. He stressed that there was a definite need for a more systematic approach to sedation in ICU rather than a 'personal preference' approach with what was certainly "inferior to standardized approaches to clinical problems" (p33). This concurs with the earlier findings of Weinert and colleagues (2001) and Weinert and Calvin (2007) who reported over sedation being a favoured state by nurses. Over sedation is associated with prolonged mechanical ventilation, higher complication rates, extended time in ICU and possibly an increase in mortality (Gehlbach & Kress 2002; Kress et al. 2000; Ostermann et al. 2000). Yet, indisputably, visually, these patients look peaceful and comfortable, and deeper sedation is perceived as kinder (Girard 2009),

but "amnesia is no longer considered therapeutic" (Egerod 2009 p693). Furthermore, patients in deeply sedated states will visually, mimic peaceful sleep. Sleep is deemed an essential state for critically ill patients to aid recovery but, it is now widely recognised that sedation does not actually promote any of the benefits of natural sleep (Rowe & Fletcher 2008). It is feasible to see why the nurses perhaps were seen to favour the more deep sedation levels; according to Egerod (2009) the nurses' role in ICU means that they often bear the " brunt of their [patients] discomfort, whereas doctors often assume the role of a visitor" (p694).

However, there are occasions when a patient will require to be deeply sedated; so they are unrousable. Pun and Dunn (2007a) suggest conditions such as hyperactive airway disease exacerbated by anxiety, ventilatory dyssynchrony secondary to hypoxia and uncomfortable procedures such as, bronchoscopy, colonoscopy or magnetic resonance imaging, may require patients to be purposely over sedated. Regular re-assessment of this need is advocated though, as the conditions are often temporary and/or resolve and sedation requirements will lessen.

4.5.1 Delirium

Although there are a number of predisposing factors increasing patients' risk of delirium, there are also a number of precipitating factors, which includes excessive use of sedation. There is now wide recognition that excessive sedation and decreased conscious levels are strongly associated with its development (Ely et al. 2004b). There was very little recognition of brain dysfunctions, such as delirium until the last decade. Delirium is a transient fluctuating state, which includes features of both inattention and disorganised thinking (Truman & Ely 2003). It is now reported as affecting between 50-80% of ICU patients; it has been found to have a relatively early onset, as little as two days following ICU admission, can last between 3-6 days, and up to 10% of patients may even be discharged still delirious (Ely et al. 2004). Ely and colleagues (2004) also reported a threefold increase in mortality for those patients whom had suffered from delirium.

The management of delirium is still relatively under studied and this is partly due to its sub types; hyperactive and hypoactive. The hyperactive subtype is a cause of agitation, described later; patients tend to be fidgety and paranoid. In contrast, the

hypoactive subtype leaves patients quiet, withdrawn and paranoid; often overlooked in practice as the patients appear calm and undemanding (Ely et al. 2001). The treatment of hyperactive states is recommended with antipsychotics, such as haloperidol, but there is still a lack of evidence supporting its long term use or the relative safety and effectiveness of other antipsychotic drugs. Hypoactive delirium is still under researched and the benefits of haloperidol or other drugs are still to be proven (Borthwick et al. 2006;Jacobi et al. 2002). A recent randomised controlled trial investigated the effects of a cholinesterase inhibitor (rivastigmine) on the duration of delirium in critically ill patients. This trial was halted early as the intervention group did not show decreased duration of delirium and in fact showed trends towards an increased mortality (van Eijk et al. 2010). The uncertainty regarding the efficacy and safety of treatments emphasises the importance of correct diagnosis and a need for further research in this area.

Non-pharmacological interventions are also recommended. These interventions include the maintenance of patients' competence by ensuring usual aids such as wearing of glasses and hearing aids are available and patients should also have access to familiar items. In the ICU setting, measures to ensure adequate light and noise reduction where possible should be in place. Furthermore, clinicians should aim to resolve any metabolic disturbances the patient is suffering that could be contributing to delirium.

4.6 Under sedation

Egerod (2009) alludes to the problems of under sedation, she refers to the nurses bearing the "brunt" (p694); this infers that the opposite of over sedation, under sedation, is deemed more unfavourable by the nurses. The management, and ultimately avoidance of, under sedation is equally important to management of over sedation (Intensive Care Society 2007). Under sedation often manifests itself as agitation.

4.6.1 Agitation

If patients are under sedated this generally manifests as agitation. Agitation is a result of both physical and psychological distress. It is defined as "a sustained state of

apprehension and autonomic arousal in response to real or perceived threat" (Tiezte and Wittbrodt 2005 p228, cited in Pinder and Christensen 2008 p65). The physical and psychological distress is multifactorial, a combination of "acute physiologic abnormalities, pain, anxiety, sleep disturbances, polypharmacy, withdrawal syndromes, and delirium" (Honiden and Seigel 2010 p187). Agitation is common amongst critically ill patients in intensive care units. Woods and colleagues (2004) reported 16% of mechanically ventilated patients developing severe agitation and Fraser et al (2000) reported it more frequently – 46%; the latter study included non-ventilated and mechanically ventilated patients. It is important to avoid and/or manage agitation effectively and efficiently in ICU because it can subsequently affect diagnoses and treatments. Agitated states also affect a patient's ability to cooperate with therapeutic interventions or monitoring (Crippen 1999). Ultimately agitation can lead to prolonged weaning from ventilation and a longer ICU stay (Cohen et al. 2002). The psychological impact of prolonged agitated states are relatively unknown (Pinder & Christensen 2008), although an area currently being explored as ICU patients are being kept in more wakeful states.

There are a number of recognised causes for agitation (Doherty 1991) such as the physiological disorders of hypoxia, pain or metabolic disturbance, environmental issues such as unnatural lighting or excessive noise and personal distress or anxiety. Pharmacological reasons for agitation are associated with the use of sedatives or a combination of sedation with other factors. These potential causal factors need to be approached in a systematic manner to ensure the appropriate treatment and management is chosen (Doherty 1991).

Ultimately the treatments chosen must reflect the needs of the patient. Some treatments will require to be initiated immediately and others will be less urgent and initiated after diagnostic tests but all interventions will require the collaboration of both medical and nursing staff, Doherty (1991) asserting that "Nursing care can maximise patient recovery" (p754). As with delirium, there are recommended pharmacological and non-pharmacological interventions of agitation management. It is recommended that non-pharmacological management should be considered before pharmacological intervention (Jacobi et al. 2002); use of polypharmacy and agitation

are associated (Pun & Dunn 2007b). It is suggested that a method of non-verbal communication should be established, a calm and reassuring demeanour should be adopted, frequent repositioning of the patient should occur, televisions and music should be used as a distraction, surrounding noise should be reduced and complementary therapies may assist a patients agitation. Equally, there is currently limited evidence to support the use of non-pharmacological interventions , although music has been shown to reduce blood pressure and lower heart rates (Byers & Smyth 1997;Chlan 1998) and massage has demonstrated reduction in anxiety (Richards 1998).

Physical restraint of agitated patients is noted as a non-pharmacological intervention too. Physical restraint is infrequently used in the United Kingdom, but routinely used in a number of other European countries as a form of agitation management (Jones et al. 2007;Langley, Schmollgruber & Egan 2011). It is often used, primarily, to preserve patient and staff safety; preventing patients from removing invasive lines and/or any physical injury to themselves or healthcare staff (Hine 2007). The Royal College of Nursing (2004) offers this definition of restraint "...restricting someone's liberty or preventing them from doing something they want to do" (p3). Currently the use of physical restraints varies in practice. A reason for this cautious approach is the potential negative effect on psychological outcomes for patients resulting from their use (Langley, Schmollgruber & Egan 2011). Jones and colleagues (2007) undertook an observational study exploring the relationship between post-traumatic stress disorder (PTSD), patients memories and sedation practices in five European ICUs. They reported that in the ICU where physical restraint was routine practice, patients had longer periods of agitation and higher rates of ICU-related PTSD. Notably the use of physical restraint is not routine practice in the UK context but is in many other European countries and in America (Hine 2007). The use of physical restraint is also noted to be associated with the development of delirium (Alzheimer's Society 2008).

Sedatives and analgesics are recommended as a source of pharmacological management of agitation, but there is no universally agreed method. Unfortunately, treatment of agitation in this way is a bit of a 'vicious circle' as both sedatives and analgesics are associated with the development of agitation and there is an added risk

of accumulation and dependency occurring (Pun & Dunn 2007b). Haloperidol, also noted as a treatment of delirium earlier, is recommended for the treatment of agitation for ICU patients (Jacobi et al. 2002; Ely et al. 2004). However, there is still limited evidence of its effectiveness short and long term (Pun & Dunn 2007b).

4.7 Sedation holds

The quality of sedation delivered in ICU is evidently an important part of a patient's journey through critical care. The achievement of optimal sedation and avoidance of both under and over sedation have been illustrated as detrimental to a patients well being and can significantly influence the trajectory of their illness (Dunn & Baker 2008). In addition to the use of sedation scales and sedation protocols, a daily interruption of sedation has been proven to also offer benefits to ICU patients. Sedation interruptions (Kress et al. 2000) are also referred to as sedation holds (Jackson et al. 2010), sedation holidays (Rowe & Fletcher 2008) and sedation vacations (NHS Quality Improvement Scotland 2009); essentially though they all mean the same thing. Sedation infusions are halted allowing patients to waken and/or becoming rousable. The reported benefits of sedation holds for patients are plentiful. There are significant reductions in the time patients are mechanically ventilated (Kress et al. 2000;Girard et al. 2008), decreased stay in ICU (Kress et al. 2000; Girard et al. 2008), reduced length of stay in hospital overall (Girard et al. 2008), they require less neurological tests for mental status changes (Kress et al. 2000), and lower mortality at one year post discharge from hospital (Girard et al. 2008). Notably, Kress et al (2000) and Girard and colleagues (2008) study's only included medical ICU patients, raising the question of the applicability of sedation holds to surgical ICU patients, where, potentially, they would be at greater risk of surgically related pain. In contrast to the sedation hold evidence and rather controversially, last year a group of Danish intensivists published findings of a study wherein they used a protocol of no sedation (Strøm, Martinussen, & Toft 2010). The intervention group of patients received no sedation, which rather unusually was the standard practice of this ICU and had been since 1999. If this group were still uncomfortable, despite boluses of analgesic for pain and antipsychotics to treat delirium, they could be sedated for six hours before they then re-started the no sedation protocol again. The

control group were assigned a sedation infusion titrated to a specific sedation scale score; boluses of analgesic for pain were available too. The study's findings revealed reductions in ICU stay and requirement for mechanical ventilation for the 'no sedation' group but the group required extra nursing resource in order to manage these patients more agitated patients. Since the completion of this study the authors followed up their study participants to investigate the psychological outcomes between the two groups, there being unease that agitated states and wakefulness could be detrimental to a patients' psychological well-being. They reported that there were no differences in the quality of life or development of Post-Traumatic Stress Disorder (PTSD) between the groups; low levels of depression were found in both groups (Strøm, Stylsvig, & Toft 2011). These findings concur with those of Kress and colleagues (2003) who followed up the participants of their sedative interruption study (Kress et al. 2000) to explore the long term psychological effects. However, caution should be exercised in interpreting these results as only a small sample of the original study participated. More importantly, the validity of the assessment tools has been questioned as being generic in nature, can overlook other potential psychological issues, and do not always consider the outcomes that are important to the actual patient (Ramsay 2011).

4.7.1 Sedation holds and patient safety

A reduction in mechanical ventilation requirement for ICU patients is clinically important; it will equally reduce their risk of developing ventilator associated pneumonia (VAP) and reduce healthcare costs. Mechanical ventilation greatly increases a patient's risk of developing VAP (Cook et al. 1998;Richards et al. 1999) which is associated with increased morbidity and mortality (Chernow 1996;DeRyke et al. 2005;Kunis & Puntillo 2003). In view of this, ventilator associated pneumonia is now a patient safety issue and its incidence is monitored nationally. A number of studies have explored the impact of sedation protocols on the rate of VAP and reductions are reported as between 5 and18% (Chanques et al. 2006;Quenot et al. 2007). To this end, an interruption in sedative infusions, a sedation hold, has been included in the safety programme (SPSP) as described earlier (NHS Quality Improvement Scotland 2009). Interestingly, the original research paper demonstrating the benefits of sedation holds for ICU patients was published over a

decade ago (Kress et al. 2000). However, it has taken a national safety programme to drive the concept of sedation holds into ICU practice across the United Kingdom. Yet, despite this national drive the adoption of sedation holds has been poor (Dotson 2010;Mehta et al. 2006;Patel et al 2009; Tanios et al. 2009). This is reflected in an audit performed locally at the Royal Infirmary of Edinburgh, the research setting of this thesis. The compliance with the sedation hold element of the 'ventilator bundle' or 'wake and wean' element was revealed to be poor (Figure 1).

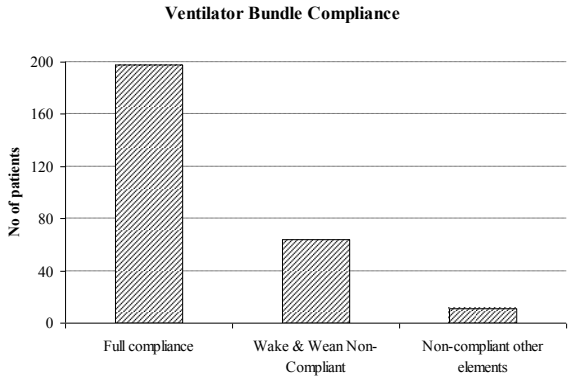

Figure 1: Ventilator Bundle compliance data from Edinburgh Royal Infirmary -showing that among 273 audited patients sedation elements account for 85% of non-compliance with the "ventilator bundle".

Currently, the implementation of sedation holds remains problematic and as yet there have been very few studies published that have specifically explored the barriers to this practice change. Tanios and colleagues (2009) survey revealed that there is a lack of nursing acceptance in their implementation due to the agitated patient states and subsequent adverse events associated with a more wakeful patients as a result. Dunn and Baker (2011) also speculate whether it is the latter fear that is hindering the implementation of sedation holds. Furthermore, the 'unknown' long term psychological sequelae were revealed as a significant concern for some clinicians (Shehabi & Weisbrodt 2011;Tanios et al. 2009).

An alternative perspective for the varying use of, and compliance with, sedation holds according to Shehabi and Weisbrodt (2011) is the "...absence of adequate evidence for universal adoption..." (p339), a view shared by others (Augustes & Ho

2011;O'Connor, Bucknall, & Manias 2009). They dispute the poor associations with improvements in mortality, and the design of the studies in terms of sample size and the heterogeneity of the populations studied. There is a call for more rigorous trials and international collaboration to improve and validate the current sedation hold evidence base which has been "a cornerstone in bundles of care" (Shehabi & Weisbrodt 2011 p340). There is an apprehension that perhaps we have changed sedation practices "prematurely" (p339). In view of a lack of valid and reliable evidence perhaps "...give less and assess more is the most reasonable approach" (p340).

Adverse Events

As Tanios et al reported (2009); adverse events such as unplanned line, tube or drain removal as a result of patient wakefulness after a sedation hold acted as a barrier to their implementation. The previous chapter, Technology in ICU, reviewed the issue of errors and the failure of healthcare systems to foster an environment to limit blame in such situations, where systems had failed rather than individuals. In a bid to acknowledge and manage adverse events (errors) occurring in healthcare organisations, they are reported using a computer software; Datix (Datix 2008). It is used widely in the NHS as part of clinical governance; it includes not only events that do occur but also those that nearly happened; 'near misses'. Such incidents are described as "...any event or circumstance arising during NHS care that could have had, or did lead to, unintended or unexpected harm, loss or damage" (National Patient Safety Agency (NPSA) 2001). The avoidance of adverse events is an integral part of healthcare practice, quality improvement and the professional duty held by both doctors and nurses; to do no harm. Aiken (2005) argues that "People now regard nursing as an integral element of patent safety and quality improvement" (p3).

4.8 Summary of chapter

Sedation practices have undergone significant changes. The changes are being implemented in practice in a bid to improve outcomes for critically ill patients. The recommendations and guidance about how sedation should be assessed and managed varies. There are also an abundance of sedation tools available to the ICU doctors and nurses to assess. Unfortunately, the mixed guidance offered and the diverse tools

appear to have hindered the pursuit of optimal sedation for ICU patients. Furthermore, the use of protocols to guide practice seems to have taken precedence over the use of clinical judgement, a 'double-edged sword' perhaps. Standardised approaches to care are deemed to increase patient safety and avoid adverse events, under, over sedation and VAP but inarguably clinical judgement and experience are as equally important in providing effective and humanistic care. There is disquiet amongst some ICU practitioners about the benefits of sedation holds for patients' long term and their applicability to *their* patients today. Reflecting that many studies are undertaken in American ICUs and in different patient groups. Patient safety is of paramount importance and patients should receive care based upon the best available research evidence but there is still an immense disparity in the adoption of the recommended sedation practices.

Chapter 5: Clinical Decision and Experiential Learning

5.1 Overview of chapter

This chapter will review the literature surrounding clinical decision making and nursing experience. The two are inextricably linked; the way in which nurses make decisions in clinical practice will change depending upon their nursing, knowledge, experience and critical thinking. The concept of clinical decision making will be explored, what clinical decision making means and why it is so important. There is a wealth of clinical decision making models in the literature, a number of these will be reviewed, examining their merit in the healthcare setting and, importantly their applicability to nursing practice. There are a number of factors that influence the decision making process, both clinical and non-clinical, these will be explored and their implications for nursing practice considered. Furthermore, the researcher reviews the increasing use of technologies to assist with decision making and examines their 'place' in intensive care. Lastly, this chapter will describe and discuss the current literature relating to nurses sedation practices and their clinical decision making in keeping with the aims of this study.

5.2 Understanding clinical decision making

A clear definition of clinical decision making is difficult to find, it is a complex term despite a wealth of literature (Bakalis 2006). It is described as a process in which a range of information from various sources is drawn upon to make a judgement (Clark 1996 cited in Bakalis 2006). The terms clinical judgement and clinical decision making are often used interchangeably to describe what is essentially the same phenomena. Furthermore, terms such as clinical reasoning, clinical inference, and diagnostic reasoning (Hardy & Smith 2008) are also referred to within the same decision making context which increases the confusion and complexity of the term. Dowie (1993) attempts to disentangle the terms judgements and decisions, he proposes that judgements are "the assessments of alternatives" and decisions are "choosing between the alternatives" (p8). For the purpose of this thesis the researcher, recognising the interchangeable use of terms within the field of clinical decision making and professional judgement and to avoid confusion has chosen the term

'clinical decision making', used to "...denote the process of making an informed judgement over the treatment necessary for [our] patients" (Hardy & Smith 2008 p19).

Bakalis (2006) proposes the reason that the definition of clinical decision making is difficult is because many authors have attempted to define the process of decision making rather than defining what a decision actually is. Clinical decisions are difficult to define due to the complexity of the knowledge, experience and critical thinking used to inform them, the vast number of decisions made and the diverse contexts in which they are made. Furthermore, 'real life' decisions also differ to theoretical decisions, the former will "...always involve situations where the possible outcomes of actions (including doing nothing) are, first, uncertain and secondly, of differing desirability" (Dowie 1993 p8), this concurs with Bucknall and Thomas (1997) who describe clinical decisions as "dynamic and unpredictable" (p229). Perhaps it is this unpredictability that renders them difficult to define.

The notion of transparent, autonomous decision making

Nurses make clinical decisions daily and unsurprisingly a majority of their decisions are related to the needs of the patients in their care and the interventions they require. Decision making is a critical notion for nurses, they have a professional responsibility "to justify, explain and defend the judgements and decisions [they] make" (Dowding & Thompson 2002 p190). Current healthcare culture demands a transparent approach to decision making whatever the outcome, as was revealed in the previous chapters in regards to adverse event reporting. Clinical Governance in healthcare practice (Department of Health 1998), endeavours to capture the decisions being made in the NHS, with a particular focus on the outcomes of these decisions; "poor practice, and the decisions that lead to it, will be ever less acceptable" (Dowding & Thompson 2002 p6). The need for stricter monitoring of healthcare practices has stemmed from vast medical advances and also a better informed patient group (Department of Health 1998). Furthermore, nurses' clinical decision making is required to engage with, and consider, current research based evidence to promote evidence based decisions in the delivery of clinical practice (Thompson et al. 2004). Yet, many nurses are still not being exposed to academic and clinical exploration of clinical decision making to help them inform their practice despite stricter regulations

in the delivery of patient care. Arguably this lack of exposure coupled with the increasing demand from regulatory bodies regarding professional accountability (Dowding & Thompson 2002 p5) is detrimental to the development of autonomous decision making in nursing practice. Traynor, Boland and Buus (2010) reported that autonomy in nurses' decision making satisfied the moral obligation that nurses' perceived themselves as having to their patient. Autonomous nursing practice enabled them to draw upon their experiences and observations rather than have their care governed by legislation, non-clinical managers and financial constraints.

5.3 Clinical decision making models

The concept of clinical decision making is complex. There is a wealth of decision making models, each offering partial explanations as to how decisions are made, how they can be understood and sometimes proposing solutions to ensure effective decision making occurs. It is not the researcher's aim to critique the workings of every decision making model but to show the reader a number of decision making models that clearly illustrate the different ways in which clinical decisions can be made and explore their relevance and appropriateness for healthcare settings. This 'model' overview will clearly demonstrate the complexity of decision making and set the scene for later discussions in the chapter.

5.3.1 Information processing model

This model is easily identifiable with the epistemological stance, positivism (see p97) which assumes a rational and logical approach to decision making, and it is mainly concerned with *how* good a decision or judgement is. The information processing model assumes that humans make decisions either using their short-term (what is happening now) or their long-term memory (stored factual and experimental knowledge) (Thompson 1999). It asserts there are four simple stages to the decision making process: (1) Cue acquisition, (2) Hypothesis development, (3) Interpretation, (4) Evaluation. This model is not a good fit for the lively, unpredictability of nursing clinical decisions as Thompson (1999) highlights "the linear sequential implications of the information processing model are not observed in practice" (p1223). In nursing practice for instance, stages could overlap and/or even change order, cues occur and are considered in a fragmented manner; decisions are far more complex

than can be offered by an ordinal approach such as this. However, according to Lloyd and Reyna (2001) the advantage of this 'structured' approach is that it has fewer margins for error. Eradication of error in healthcare is impossible (Leape 1994) but it should be minimised. Good clinical decision making is required to reduce errors occurring but must also be achieved in a timely manner, a rational and logical approach such as the information processing model will be more time consuming.

5.3.2 Dreyfus model of skill acquisition

The Dreyfus model which described fives levels of nursing experience that will influence the way in which decisions are made these are, Novice, Advanced Beginner, Competent, Proficient and Expert (Benner 1984b). This model adopts a more humanistic approach, less systematic or task orientated than the information processing model and considers intuitive behaviours. A 'Novice' nurse is essentially a beginner with no experience, they are taught general rules to enable them to perform tasks. Their decision making is therefore rule governed, context free, inflexible and applied universally; if they are told to do something they will carry out the task given to them. Inexperienced or novice nurses are new to, inexperienced in, a certain situation or task, and who will only perform to a certain level (Noyes 1995); they can only do what they know, which is limited at this stage. 'Novice' or as they are often referred 'Inexperienced' nurses are also thought to have less confidence, less knowledge, less time spent in the nursing profession, and thus less exposure to particular events, information and situations (cues), which all pertain to experience. An 'Advanced Beginner' has gained enough experience to recognise repetitive and meaningful cues in situations and the principles of their decision making are based upon this. A 'Competent' nurse is one deemed to have been working in the same/similar nursing environment for 2-3 years and has developed an awareness of short term and long term goals. They use conscious, abstract and analytical thinking to make their decisions which will have become more efficient and organised at this level. A 'Proficient' nurse has developed more holistic decision making processes; they will learn from their experiences and be capable of modifying their plans if a situation occurs that they had not anticipated. Finally, an 'Expert' nurse will find they no longer rely on guidelines, rules or principles to guide their decisions and

actions. They have developed a breath of nursing experiences, they will have intuitive grasp of situations and they are proficient and flexible in their care delivery (Benner & Tanner 1987b). Expertise, according to Paul and Heaslip (1995), is when "the nurse has developed the ability to use appropriate nursing knowledge and skilled judgements in delivering client care" (p40). The 'checklist' for an 'expert' nurse includes attributes such as, abstract knowledge, intellectual capacity to contextualize, 'sound' thinker, disciplined and an effective problem solver (Paul & Heaslip 1995).

The notion of intuition

Intuitive behaviours are deemed very much a skill acquired by nurses termed 'expert' or 'experienced'. The term 'experienced' is sometimes found to be used synonymously with 'expert', but this is probably incorrect according to Easen and Wilcockson (1996) suggestion that, it is "possible to have experience without expertise but virtually impossible to have expertise without experience" (p672). Often in the literature, inexperienced nurses are referred to as 'novices' and experienced nurses as 'experts', revealing that the terms experience and expertise are often used interchangeably. However, as described above, 'expert' nurses are those who show advanced levels of knowledge and skill which they have gained through experience (King & Clark 2002;Radwin 1998;Thompson, Ryan, & Kitzman 1990); highlighting that there is a clear difference between the concept 'experienced' and 'expert'. A firm, unified, definition of intuition has not been agreed. It has been described as "understanding without rationale" (Benner & Tanner 1987 p23), the "immediate knowing of something without the conscious use of reason" (Schraeder & Fischer 1987 p45) or even simply, the "process whereby the nurse knows something about a patient that cannot be verbalized, that is verbalized with difficulty or for which the source of knowledge cannot be determined" (Young 1987 p52). The 'expert' nurses will no longer be reliant upon their analytical skills to understand and assist in taking action; instead they will have an almost unconscious level of cognition (Hamers, Huijer Abu-Saad, & Halfens 1994). This links with Carper's (1978) aesthetic knowledge (see p11); knowledge is gathered as a result of the nurses unique experience. Intuitive decision making is often viewed as an unsound way of making decision; it is considered as being unreliable, anecdotal and unscientific (McCutcheon & Pincombe 2001). In current healthcare where decisions in clinical practice should be evidenced based intuitive

process remain "contentious" (King & Clark 2002 p322). This is partly due to the recognition that this type of decision making has large margins for errors to occur (Croskerry 2009) however, equally intuitive behaviours informed by clinical experience and knowledge, can positively affect patients' quality of care and outcomes (McCutcheon & Pincombe 2001). There will be occasions when structured, logical decision making is inappropriate, untimely or fails to provide necessary information to inform decision making but a clinician's expertise and experience of similar situations and patient presentation can. In fact, despite the intuition being difficult to define and verbalise, and being disregarded as unscientific, there have been studies that have revealed that in fact intuitive practices are often logical and rational but just not outwardly so. McCutcheon and Pincombe (2001) conclude intuition is "a result of a complex interaction of attributes, including experience, expertise and knowledge, along with personality, environment…" (p345). Benner and Tanner (1987) propose that in fact there are six aspects to intuitive decision making, making it less mysterious than it first appears. The first aspect is 'pattern recognition' which is the implicit identification of relationships between variables in a situation. The second aspect, 'similarity recognition', is the ability for the nurse to recognise similarities and differences drawing upon past and present situations. The third aspect is 'common sense understanding' which requires the nurse, whilst providing routine care, to be able to quickly identify and understand changes in patients' clinical presentation. The fourth element is 'skilled know-how', wherein the nurse will effectively balance a number of different options during their decision making and closely linked is the fifth aspect, 'a sense of salience' which is the nurse being able to prioritise the cues the clinical situation presents. The final element is 'deliberate rationality' which involves the nurse being able to select where she focuses her attention during a situation, this is based upon their previous experiences of similar circumstances.

Nursing and the experienced nurse

The Dreyfus skill acquisition model examined earlier clearly describes the spectrum of nursing experience and the attributes each level requires. Watson (1991) described 'experience' as a euphemism for learning; he also regards it as a concept

involving the exposure of people to situations and the development of their skills and knowledge as a result of this exposure. However, surprisingly, although experience is continually reported as being gained over time (Watson 1991) the exact amount of time seems to be a vague area. It has been proposed that anything from eighteen months to five years within one clinical area could be recognised as 'experienced' (Benner, Tanner, & Chesla 1992;Corcoran 1986). Benner, Tanner and Chesla (1992) suggests that a 'competent' nurse is one who has been in post for '2-3 years, however she does not supply such a time frame for 'expert' nurses. Watson (1991) surmises that it could be nurses' with 10 years or more experience as these are used in Benner's 'expert' nurse work. However, despite the recognition of experience as an essential component in decision making by many in practice the nurses perceive it to be undervalued and inferior to medical 'evidence'.

5.3.3 Dual process model

The dual process model works on the premise that there are two systems humans engage with to make decisions. System 1 which utilises and engages with intuitive systems as described above. Decision making is "automatic, fast, frugal and effortless" (Croskerry 2009 p e173) because intuitive processes tend to be influenced by initial responses and reactions to situations and context and cue dependent. System 2 uses more analytical processes and therefore decision making is "deliberate, slower, costly and effortful" (Croskerry 2009 p e173). Figure 2 nicely illustrates the differences between the two systems.

Property	**System 1: Intuitive**	**System 2: Analytical**
Reasoning style	Heuristic	Normative
	Associative	Deductive
	Concrete	Abstract
Awareness	Low	High
Prototypical	Yes	No, based on sets
Action	Reflexive, skilled	Deliberate, rule based
Automaticity	High	Low
Speed	Fast	Slow

Channels	Multiple, parallel	Single, linear
Propensities	Causal	Statistical
Effort	Minimal	Considerable
Cost	Low	High
Vulnerability to bias	Yes	Less so
Reliability	Low, variable	High, consistent
Errors	Common	Few
Affective valence	Often	Rarely
Predictive power	Low	High
Hard-wired	May be	No
Scientific rigour	Low	High
Context importance	High	Low

Figure 2: General properties of the two systems (adapted from Croskerry 2009)

Croskerry (2009) importantly points out that clinicians should be aware of the interaction between System 1 and System 2 particularly their ability to override one another. The ability of System 1 to override System 2 he suggests is "for the most part regrettable" (p e174). He illustrates this by pointing out that it frequently occurs in healthcare practices, often to the detriment of patient care, it is when clinicians will persistently continue with clinical practices that have no research based evidence using 'personal preferences' to inform their decisions. On occasions when System 2 overrides System 1 it can prevent inappropriate decisions and actions occurring but can also lead to "paralysis by analysis" (Croskerry 2009 p e174) resulting in no action at all being taken which is equally as detrimental to patients. The dual process model highlights the vulnerability of the different aspects of the decision making process encouraging clinicians to be more insightful and aware of missed and/or ignored cues that could aid or hinder their decisions. Croskerry (2009) concludes saying

"Despite the fallibility of System 1 reasoning, it is clear that we cannot live without it. In any event, we could not depend exclusively on System 2. It requires a major commitment of

time and resources that simply is often not available. Thus both systems are essential…the key to well-calibrated performance is some optimal balance between the two" (p e176).

Both experimental and intuitive approaches are required to inform decision making, each with their own weaknesses.

5.3.4 The cognitive continuum

Another popular decision making model referred to in the nursing literature is the cognitive continuum model, addressing the gaps between experimental knowledge and intuitive behaviours used to inform decision making.

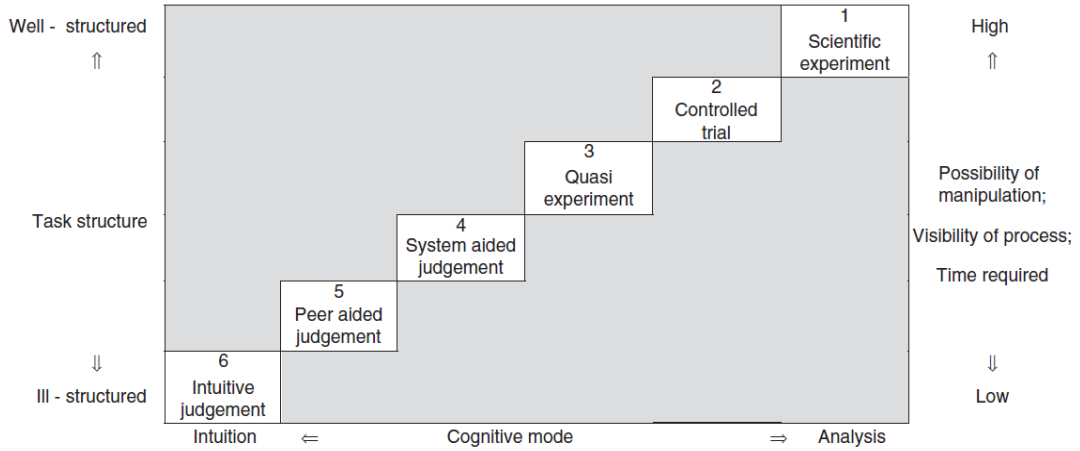

Figure 3: Cognitive continuum model (Hamm 1988 p87)

Hammond (1964) developed this theory by comparing nurses with wood ticks. An unlikely pairing, he refers to the wood tick as a simple organism that is only capable of responding to one cue at a time and a cue which is absolutely dependable, this the polar opposite to the day in the life of a nurse. He identified that daily decisions nurses made were neither clear cut or unambiguous, in actual fact they were complex and no two situations, even if faced with the same clinical picture necessarily had the same outcome for nurse or patient involved. He acknowledged that "life is filled with uncertainty for the nurse" (Hammond 1964 p316). As Figure 3 illustrates, the model considers analytical thinking (information processing) as the first mode and intuitive judgement as the sixth and final mode but also considers task structure, cognitive mode and time available, recognising that they influence whether a more analytical or intuitive approach is adopted. If a task is ill (poorly) constructed, has lots of

information cues, but very limited time the decision made will be more intuitive (mode 6). On the other hand if the task is well-constructed, with few information cues available, but considerable time available the decision made will be far more analytical (mode 1). Healthcare settings dictate that most decisions made will be placed around 'System aided judgement' (mode 4). System aided judgement includes the involvement of clinical guidelines and/or decision trees, checklists and protocols. It is suggested that guidelines and protocols will improve the decisions that healthcare workers make and reduce the margin for error to occur in, especially in view of the vast number of decisions made daily. The use of such checklists and protocols were advocated in an earlier chapter (Vincent 2010) as part of the research based evidence approach in current healthcare settings and proven to reduce error in healthcare (Leape 1994). The Canadian Nurses Association (2002) concur stating that

"Appropriately applied, guidelines can reduce uncertainties associated with clinical decisions, diminish variation around usual practices, demystify unfamiliar terminology and decrease the need to search for journals and articles" (p1).

The cognitive continuum undoubtedly recognised the challenge of context in decision making and acknowledged the different forms of knowledge that can be used, but it was still deemed a very medically influenced model, 'top heavy' with experimental and scientific research, and not fit for nursing practice.

5.3.5 The revised cognitive continuum

Standing (2008) revised the cognitive continuum in order to reflect nursing perceptions of the complexity of clinical decision making and ensure patient centeredness and nursing experience is considered as part of the process. A more inclusive approach to clinical decision making is welcomed in practice "…the traditional methods have restricted the development of the field and why research methods need to be changed if we are to successfully take the next step beyond rationality, which is understanding the nature of wisdom" (Hammond 2007 p224).

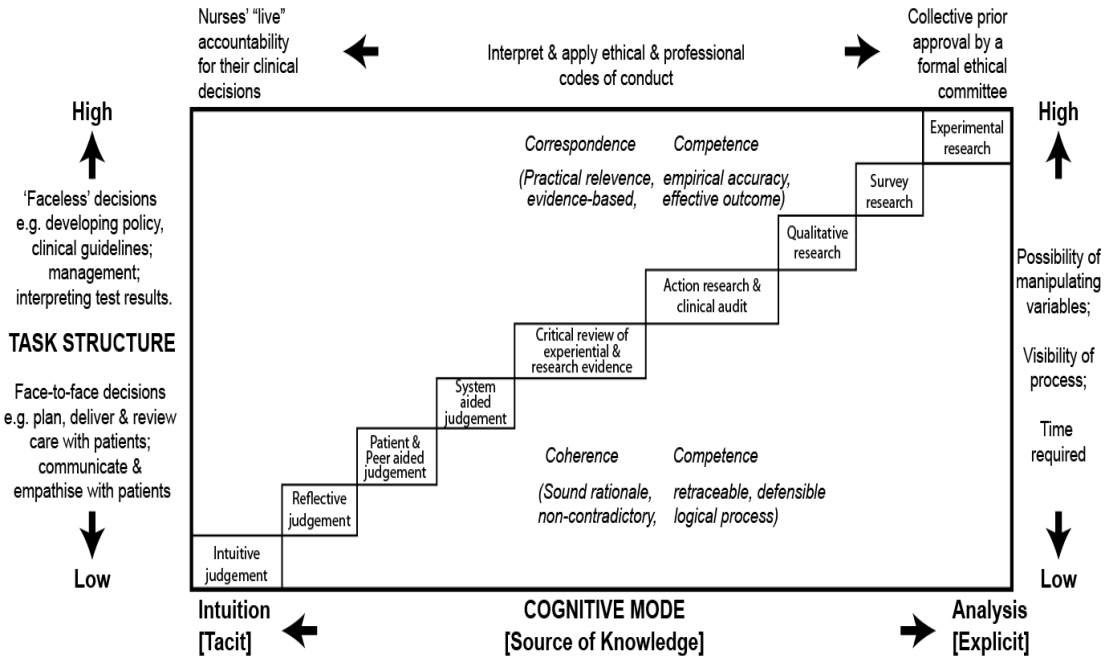

Figure 4: Standings revised cognitive continuum (Standing 2008 p130)

Furthermore, the revised version removed potential ambiguity for the healthcare setting and has added new modes to the continuum. The task structure element of the model has been re worded to 'low' and 'high' instead of 'well' and 'ill' as it was felt within the context of healthcare this was far too ambiguous. Three additions made to the continuum in order to reflect contemporary healthcare are reflective judgement, action research and clinical audit, all key contributors to ensuring consistent high quality healthcare delivery. Notably, the revised model's modes are purposively not numbered to indicate more fluidity between the modes, and the opportunity to move back and forth between modes as the process of 'real' decision making dictates. This revised model 'fits' better in today's nursing practice. It pays consideration to elements of quantitative research that are used to inform research based evidence and qualitative research which bridges the gap between the numbers and patients.

5.4 Decision differences

The decision making models clearly illustrate that clinical decision making can, and probably should, draw upon different types of knowledge in order to ensure that quality care is being delivered to patients. However, decision making is strongly

influenced by the experience of the clinician making the decision and the context in which the decision is being made. These factors, in clinical practice, are impossible to control. Undeniably though, an appreciation and understanding of their effects on decision making processes will enable better decisions to be made and fundamentally better care delivered.

5.4.1 Doctors, nurses and decision making disparity

Different decision making between doctors and nurses was evident in the previous chapter. The ICU nurses' decision making regarding the optimisation of sedation differed from that of the doctors, namely that they tended, for whatever reasons, to be *less* likely to judge a patient as being over sedated. The process by which doctors and nurses make decisions is inherently different. Arguably the doctors' remit is diagnosis and treatment focused, essentially approaching this from a scientific and empirical perspective (West 2011). Doctors' decisions are renowned as being more "rational and empirical" and sometimes viewed "of greater value" (Hardy & Smith 2008 p20) as a result. Nurses use a myriad of approaches, including empirical knowledge, but also draw upon personal, aesthetic and ethical notions, as illustrated by Carper (1978), which enables them to make holistic decisions. Nurses engage in more 'intuitive' decision making; "…perceptual awareness…tacit knowledge and implicit knowledge…" (Easen & Wilcockson 1996 p668). Although distinctly different, but no less important, some nurses described their clinical 'knowing' of patients as extremely relevant to their clinical decisions and their previous experience caring for a patient and knowing their background and history reduced the complexity of decisions they made (Currey & Worrall-Carter 2001). This brings forth the debate regarding whose decision is more potent, the empirical approach or the holistic approach and is amenable to Brunswik's 'lens model' of social judgement theory.

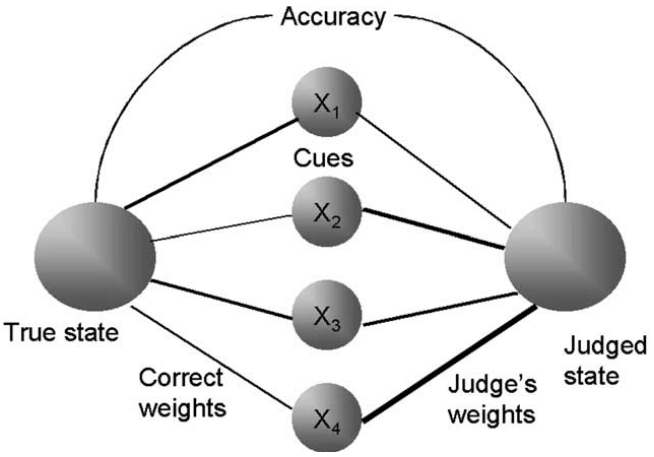

Figure 5: Lens model of cognition and information use (Thompson et al. 2005)

The 'lens model' has been used to model the diagnostic abilities of various healthcare professionals. The perceived power and potency that nurses and doctors attach to certain cues available to them will ultimately influence their acceptance of one decision rather than another. It recognises that it is sometimes difficult for people to verbalise the cues they are using to guide decisions, intuitive behaviours for instance, but that being able to predict relationships between judgements made and information available would be useful in clinical practice, particularly in critical care where small information changes can have a significant bearing on a patients morbidity and mortality.

Professional discord in decision making

Arguably the different decision making approaches stem from the way in which education and training is delivered to the professions but is compounded by the traditional doctor-nurse hierarchy and the professional conflict this has perhaps facilitated. The traditional hierarchy in healthcare amongst doctors and nurses persists through decision making processes and remains embedded in practice irrespective of the extended roles nurses have developed in ICU (Coombs 2003), and despite a nurse's clinical experience. According to Hardy and Smith (2008), despite a nurse making an assessment and then forming a judgement the 'final' diagnosis is still made by the doctor and in fact suggest that "Many experienced practitioners have become adept at forming a diagnosis, the ultimate decision is made by our medical

colleagues" (p20). This concurs with Coombs (2003) study, wherein nursing staff described a lack of opportunity for nursing participation in clinical decisions and described their relationships with medical staff as solitary and dissatisfying as a result. One of the nurses in Coombs (2003) study neatly summed up the unsatisfactory collaboration during decision making stating "…what's the point? If medicine is running one race, and nursing another – they may as well shut the unit…" (p132). This again clearly illustrates the opposing approaches that medical staff and nursing staff apply to make decisions. There appears to be an ongoing struggle to ensure that nurses' knowledge, experience and skills are valued and translated into clinical decision making in order to improve the quality of healthcare (Department of Health 1999;Department of Health 2000b)). Once again the issue of autonomy arises. According to Bakalis and Watson (2005), the facilitation of more autonomous decision making would assist in rebalancing the power between nursing and medical professions. Nevertheless, this is unlikely to be achieved unless there is "…acknowledgement and respect of *all* types of knowledge and roles that are required in totality by the critically ill patient" (Coombs 2003 p133, my emphasis). Fairman (2004) asserts that it remains that "nursing's claims for autonomy and authority require toppling medicine from its lofty pedestal of cultural authority" (p451). However, Bates's (1973) suggests that

"Perhaps the problems of doctor and nurse are not so much professional, as simply human...[Physicians] must learn to share to share rewards, both psychological and economic and to share responsibility in a risk-fraught world where our training has taught us to depend only on ourselves...And we must learn to communicate sufficiently with one another so that each may function effectively, and safely, and reasonably efficiently" (p22).

Bates's suggestion points towards a failure in team working as the 'real' explanation for the lack of unity across healthcare disciplines decision making. Particularly the failure to recognise the value of team members' knowledge, experience and skill and perhaps most importantly how these attributes assist in making holistic decisions for patients.

5.4.2 Clinical decision making in contrasting settings

A number of observational studies have been carried out to try and highlight the number and type of decisions that nurses make. One study, interviewed and observed a mixed group of nurses (n=108) during their daily practice and drew up a list of the decisions the nurses made. A list of twenty decisions was devised, the main types of decisions were reported under six headings; intervention/effectiveness, targeting, timing, communication, service organisation, delivery and management and finally, experiential, understanding or hermeneutic (Thompson et al. 2000). This clearly illustrates the vast number and type of decisions nurses make drawing upon a myriad of 'knowings', experiences and critical thinking. The study reported that the nurses, on average, made a decision every ten minutes (Thompson et al. 2000 p65). Bucknall (2000) reported the nurses in her study making a decision every thirty seconds. The disparity between the findings of these studies is due to the setting in which they took place. The first study reviewed general ward based nurses' decisions and Bucknall's study reviewed intensive care nurses' decision making. Intensive care nurses decisions are widely recognised as being different from those of nurses in general wards namely due to the complexity of ICU patients needs (Bakalis & Watson 2005;Carnevali & Thomas 1993). The intensive care setting has high staffing levels, advanced technologies and critically ill patients and it is expected that ICU nurses' decision-making demonstrates "high levels of autonomy, responsibility and accountability" (Bucknall & Thomas 1997 p229). Interestingly these are the same attributes identified by nurses interviewed to be threatened in clinical practice. Is it accepted, and acceptable, then that research based evidence takes precedence over holistic nursing care, especially from a medical stance, making autonomous practice difficult for nurses to achieve and undermining their professional responsibility and accountability as a result?

5.5 The clinical and non-clinical influences of clinical decision making

5.5.1 Clinical influences

The ICU setting

As alluded to earlier, decision making in ICU is further complicated by the ICU environment itself, often described as that of flashing lights, frequent audible alarms and ongoing technological demands. Currey and Worrall-Carter (2001) propose that the decisions made by nurses in quiet side rooms will undoubtedly differ from those in busier noisier intensive care units. Busier and noisier settings increase the number of decisions required to be made by the intensive care nurses adding to the complexity of decisions (Bucknall & Thomas 1997). Croskerry (2002), albeit referring predominantly medical staff, states that "the ultimate cornerstone of high-quality care in emergency medicine [intensive care] is the accuracy, efficacy and expediency of clinical decision making" (p1184). His comments highlight the pressure in environments such as, intensive care, to make decisions but most importantly, the right decisions. However, it also again illustrates the different sorts of decisions that medical staff prioritise and make, essentially concerned with the speedy diagnosis and administration of the appropriate treatment.

Staffing levels

Inadequate staffing levels have been highlighted as increasing pressure and stress and influencing care decisions. Currey and Worrall (2001) argue that a lack of support hinders nurses' ability to perform care procedures for their patient which highlights the significant impact resources can have on nurses' decision making. Traynor, Boland and Buus (2010) reported that "the most fundamental obstacle to autonomous decision-making was stress caused by poor working conditions and high workloads" (p1510). The nurses in their study felt they were unable to make "proper and safe professional decisions" (p1510) as a result of increasing clinical workload. The inability of nurses to feel they are making safe, professional decision for their patients is counter to Carper's (1978) patterns of knowledge and impedes the delivery of holistic nursing care and prohibits autonomous practices.

5.5.2 Non-clinical influences

Although there appears less published literature around non-clinical influences of clinical decision making they are equally as important and worth consideration, and even proposed as a barrier to the implementation of evidence based research in clinical decision making (Hajjaj et al. 2010). Non-clinical influences relate to both

White's (1995) fifth pattern of knowing described earlier (see p13), the influence of current healthcare economics and organisation, and Carper's (1978) moral component of knowledge. According to Hajjaj and colleagues (2010) non-clinical factors can be reviewed under three sub-headings, patient-related, healthcare-practitioner related or practice-related, but it should be noted that they overlap with the clinical influences.

Patient related influences

Patient related factors include patients' socioeconomic circumstances, perceived adherence to treatments as a result of lifestyle choices, patients' wishes and preferences, and family beliefs and preferences. In some countries a patient's socioeconomic status may influence the treatments and management they receive and they will be altered to meet a patient's financial capabilities. Although this may appear strikingly immoral it is a very real consequence in some healthcare systems (Bernheim et al. 2008). Such approaches to healthcare delivery must be considered in terms of Carper's (1978) ethical component of knowledge. Surely any ethical decision making is difficult if the patient is unable to afford the care and treatments that *are* available but just not personally affordable by the patient. The moral obligation nurses are described as feeling towards their patients is invalid in these circumstances. Equally, if it is deemed an individual is unlikely to adhere to a treatment plan a less aggressive approach may be adopted by treating clinicians. The concept of patient wishes and preferences is often difficult to apply in ICU, as patients are usually mechanically ventilated and unable to verbalise their wishes, and often this responsibility lies with a patient's family or next of kin. Furthermore, difficulties arise when patient or relative preferences are against the wishes and beliefs of the healthcare worker caring for the patient and what they deem as the optimal treatment option (Hajjaj et al. 2010), for instance if a patient refuses a treatment or an intervention to treat their illness.

Healthcare-practitioner influences

Healthcare-practitioner factors include personal characteristics, time constraints and their relationship with interdisciplinary team members. Despite evidence based

research being available to assist and guide decision making it is still recognised that 'personal preferences' continue to be commonplace in healthcare practice (Hajjaj et al. 2010), as earlier illustrated by Croskerry (2009) in System 1 and System 2 approaches to decision making. This is also more simply demonstrated by two studies. One reported that female clinicians are more likely to be influenced by psychosocial factors than their male counterparts (Tracy et al. 2005) and another that younger clinicians will order more tests than older clinicians (Mckinley et al. 2002). This links back to the Brunswick lens model earlier, wherein different individuals place emphasis on different information cues depending upon their assumptions, knowledge, understanding and perceived priorities. Furthermore, the capabilities of a clinician, essentially their experience, professional status and networking, are also noted to influence decision making (Hajjaj et al. 2010). This highlights the importance of 'experience' in decision making processes, yet nurses experience would appear to still be undervalued.

Practice-related influences

Lastly, practice–related factors consider the influence of resource availability, policies and treatment costs. Healthcare organisations are becoming more economically driven and there are cost considerations and implications for all healthcare related care. There are a number of explicit pressures on healthcare organisations to meet national targets, despite patient care potentially suffering as a consequence. One study revealed that patients discharged early from ICU due to resource constraints have a higher morbidity (Lin, Chaboyer, & Wallis 2009). In the current economic climate, factors such as these are destined to become more prevalent, and awareness of their influence on the clinical decision making process, needs to be recognised and 'factored in'. A lack of discrete autonomy is also a reality when decisions are often governed by regulatory bodies, particularly the pressures to meet national targets.

5.6 Technology assisted clinical decision making

As highlighted in the chapter addressing technology, with the ever advancing technologies in healthcare there is a growing body of literature surrounding the use of

computer-assisted clinical decision making tools and clinical decision support systems (Anderson & Willson 2008;Custer, Spaeder, & Fackler 2008). It is intended that such systems assist in the implementation of evidence based practices in clinical practice and have been developed to match patient characteristics with a pre-set evidence base whereby they generate specific care/treatment recommendations to assist clinicians' decision making (Anderson & Willson 2008). A synthesis of the literature surrounding support systems revealed diverse results as to the perceived benefits and value in clinical practice. Some nurses perceived the software to be an essential 'support' to their decision making (Cathain et al. 2004), and viewed as offering clearer direction and increasing confidence in their decisions (Eley et al. 2005). In contrast, another study reported that the nurses felt its implementation lacked leadership compounded by a lack of time for adequate training in its use, and unsurprisingly felt the technology had deficiencies (Clark et al. 2005). There were also reports that it did not assist in improving nurses' knowledge (Zielstorff et al. 1996) and offered no additional benefits to normal practice (Fitzmaurice et al. 2000). Notably, none of the studies reviewed by Anderson and Willson (2008) included the use of such systems within the ICU setting. Eley and colleagues (2005) study, however, investigated perceptions of support systems use in trauma triage and reported positive findings. It appears that decision support systems are still to enter the intensive care world where, arguably, it may be an area that could benefit with the multiple auditory distractions, data overload and increasing workload (Custer, Spaeder & Fackler 2008). Although the systems have proven positive effects on patient outcomes, their implementation into ICU practice seems to been delayed due to the presence of negative findings. One paediatric ICU demonstrated an increased mortality as a result of implementing a decision support system (Han et al. 2005). The possible reasons for such a finding were suggested to be the increased time to enter computerised orders, orders which could not be entered in the system until the patient was present in the ward and communication disruptions between the doctors entering an order and its assessment and implementation by the nurses (Han et al. 2005). The impact that decision support systems have upon patient care workflow (Sittig et al. 2006) is a cause for concern and suggest that such technological developments will probably need to demonstrate a consistent improvement in patient

outcomes before organisations or clinicians will fully accept them into clinical practice (Custer, Spaeder & Fackler 2008). Despite this, Custer and colleagues (2008) contend that decision support will be crucial for ICUs in the next 20 years because

"As providers, we must acknowledge decision support is crucial for the safety and recovery of our patients. No one can recognize everything, know everything, and decide everything in real time..." (p8).

This may be true, but undoubtedly it will be argued that this will only add to the 'art' of nursing being further lost as technology replaces humans. It appears that a balance is required between enhancing patient safety, protecting patients from unnecessary harm as a result of human fallibility and still maintain humanity and patient individuality in any decision making process.

5.7 Sedation and clinical decision making

The literature clearly illustrates that clinical decision making is a thorny issue in healthcare practice. Unsurprisingly then, according to Aitken et al (2008) there is, as yet, only a very modest amount of research been undertaken to understand how ICU nurses make decisions in the assessment of a patient's sedation level and appropriate administration of sedation. Chapter 4 demonstrated a wealth of published literature addressing sedation but very little specifically reviewing their decision making around sedation use and none that have explored nurses' decision making on sedation holds. This, despite the fact that most patients receive sedatives during their ICU admission, that a number of significant changes taken place in its management, and evidence that doctors and nurses manage sedation differently. Numerous guidelines have been devised to assist clinicians' decisions in the optimisation of ICU patients' sedation but it is recognised that, alone, they are unlikely to affect bedside practice behaviour (Schorr 2008). Such guidelines are widely acknowledged to be under-used, open to subjective interpretation and not suited to an individualised nursing care approach (Aitken et al. 2008).

Weinert and colleagues (2001), in a study alluded to in earlier chapters, used focus groups and interviews to explore factors that affected nurses' delivery of sedatives.

They identified five main themes that influenced a nurses delivery of sedation, families, nurses personal beliefs and attitudes, the nurses interpretation of the patients conscious level, workload and communication with doctors. They concluded that these non-patient factors were central in the delivery of sedatives to ICU patients and that the goals of sedation should be well communicated between ICU teams to improve patients care (Weinert, Chlan, & Gross 2001).

Tanios and colleagues (2009) undertook a web based survey to examine use of sedation, and explore the use of sedation holds in current practice. They identified distinct barriers to the implementation of sedation protocols and the implementation of sedation. Notably, the primary respondents of their survey were physicians, 60%, followed by nurses, 14% and the overall response rate was poor at only 7.1%. Furthermore, the survey was a multiple-choice design which could have constrained responses given. Additional qualitative answers were not sought. A third of the nurses described a lack of physician order as hindering their decisions to use a sedation protocol and yet, in contrast, a fifth of physicians perceived a lack of sedation protocol use due to a lack of nurse interest which in turn, they suggested, was the reason they failed to place sedation orders. The authors did not disclose whether these findings were statistically significant. Although not entirely clear from the findings presented it appeared that the sedation protocol use was almost optional and a physician 'choice' rather than a fully adopted ICU practice. This offers an explanation for the concept of a sedation protocol 'order'. The protocol had not been integrated into clinical practice to empower the nurses to take ownership of their patients' sedation; it was still being medically driven. The survey also reported that nurses' decisions regarding sedation holds were highly influenced by patient safety, respiratory comfort and the risk of self-extubation. However, the authors also reported that the use of sedation holds between nurses and doctors was found not just of no statistical difference but of no difference at all. Unfortunately the survey approach used prevented the authors from examining these factors more closely and they could only offer inferences. They suggested that the study's patient population contained large numbers of patients with withdrawal syndromes who would be more prone to agitated and unsafe behaviours when sedation was halted (Tanios et al. 2009). They also proposed that sedation holds were coordinated to match physicians

ward rounds and that they were sometimes viewed as inconvenient. This suggests that the sedation holds were 'physician-centred' rather than 'patient-centred' decisions and once again sedation management controlled by the medical staff. The authors concluded that ICUs should re-examine sedation protocols, the use of sedation holds and the overall heterogeneity of sedation practices (Tanios et al. 2009).

Aitken and colleagues (2008) specifically focused upon nurses' clinical decision making in the assessment and management of their patients' sedation. Their findings demonstrated the complexity of decision making but also the importance of optimal decisions in the sedation assessment process. Nurses' sedative use was highly influenced by 'knowing' their patients: their history, health status and any previous responses to sedative interventions. However, it also appeared that a patient's neurological status was more likely to drive their sedation assessment and management decisions, even before pain and comfort. Aitken et al (2008) proposed that this may be explained by the objectivity and "tangible" nature of neurological assessment (p43) whereas pain and comfort is seen as a more subjective form of evidence. They found the nurses described sedative and analgesic use within the same contexts indicating a lack of knowledge regarding their appropriate use. In view of the slow, fragmented changes to the way in which ICU patients' sedation is managed in clinical practice, despite the research evidence, further insights into the nurses' clinical decision making in their sedation management could prove invaluable. Alongside the available empirical evidence, nurses' experience, knowledge, critical thinking and 'experiences' will be essential components in their decision making. It is essential that these are not only given due recognition, but also that awareness of their implications for sedation practices is required in order to improve patients and nurses experience of sedation.

5.8 Summary of chapter

Nurses draw upon various forms of knowledge and resources to help them make decisions. A nurse's experience underpins all their decision making. Novice nurses not only might make different decisions but the processes they use to reach these decisions is different too and the effects of this, in terms of patient wellbeing and

outcomes, must be understood. There are a number of organisational, contextual and moral and ethical factors that influence the decision making process and the intensive care environment only adds yet further complexity to decision making. Often decisions have to be made rapidly whilst contending with an abundance of information cues often presenting as distractions and the fear or there being too much information to recognise and process effectively in intensive care. It is being proposed that computerised decision support systems may be more readily used in ICUs in the future but the uncertainty remains as to this being a further burden or benefit. Nurses' clinical decision making in terms of sedation is under researched and poorly understood. In view of the significant changes in the way in which sedation should be assessed and managed, insights into nurses' decision making would certainly assist in overcoming recognised difficulties and arguably enable education, utilisation and organisational demands to acknowledge their needs.

Chapter 6: Research design

6.1 Overview of chapter

The following chapter will address the research design of the research study. It will begin by examining the methodological issues, exploring the purpose of qualitative research and the essential components of this approach. The theoretical and methodological approaches that have been chosen to inform this research inquiry will be defended, including examination of the advantages and disadvantages of interviews as a method within the context of this research. The latter part of this chapter will describe the sample from which the participants were drawn and the implications of the processes and decisions the researcher made in regards to this. The ethical considerations given to the research process will be highlighted and the potential conflicts of interest in view of the researcher's role in the quantitative trial that her qualitative work complimented will be explored. Lastly, the researcher will clearly outline the way in which the analysis of her data was undertaken and the challenges and considerations this posed. It is hoped this chapter will clarify the journey in which the researcher took in choosing her research approach and offer a good argument in defence of these choices. It also includes reflection of the challenges the researcher met on her research journey and how these were overcome.

The reader will note a strong influence from Crotty (1998) in this chapter. His seminal work, 'The Foundation of Social Research', is consistently referenced in research design literature, and is informed by the needs expressed by his research students. Hence, the researcher, new to qualitative research, found this text 'friendly' and understandable.

6.2 Research Aims

- To explore the world of the intensive care nurse and elicit narratives of:
    - the nurses views of sedation and technology within an ICU setting
    - the nurse's 'world' of decision making in relation to sedation management.
    - the nurses feelings and views of a responsiveness monitor within the context of critical care.

- To explore implications of the findings, and their interpretations, for critical care nursing practice

6.3 Qualitative research

A qualitative approach has been adopted for this research study. This type of research presents its findings in the form of texts rather than figures and numbers used in quantitative research (Guba & Lincoln 1998). Qualitative research in the field of healthcare according to Benner (1994) prevents us from completely "medicalizing" the study of health and illness, which she argues is primarily concerned with "the study of disease, cellular processes, biochemistry, and treatments" (pxvi). Qualitative approaches offer insights in to the corners of research that quantitative approaches are unable to explore, they "obtain knowledge about the characteristics, complexities and interrelationships of phenomena, often specific human matters such as experiences, emotions, beliefs and motives" (Malterud 1999 p201). However, it has taken a long time for qualitative research to be recognised in this light. In the past it was viewed as merely "anecdotal" or "distorted by emotional factors" (Rusinová et al. 2009 pS140). Qualitative research in healthcare is now recognised as a necessity; it bridges the gap between the numbers and the patients, families and staff who use, and work in the healthcare 'world' (Rusinová et al. 2009). According to Jones (1995), it "close[s] the gap between the sciences of discovery and the sciences of implementation" (p2). Intensive care research, historically embedded in quantitative research, perceived as the 'comfort zone' of the intensivists managing the units, is now being enriched with qualitative explorations. Indeed, the difference in the research approaches, stark contrasts to one another in aims and methods, now work "synergistically" together (Rusinová et al. 2009 pS144). The most appropriate method for this study was a qualitative approach. It was open to unanticipated findings and serendipitous occurrences, and not pursuing fixed measurements or testing a hypothesis only possible through qualitative research (Bryman 1984).

The researcher wishes to make explicit that this doctoral thesis, a qualitative research study, sits aside a quantitative trial the researcher coordinated simultaneously. The literature review described a sedation monitor, responsiveness monitoring, which was trialled in a randomised controlled trial (RCT) (see Appendix 10). The nurses'

experiences and perceptions of this novel monitor formed part of their interviews, and, thereafter the interpretative analysis. The qualitative research was not bound by the quantitative study's success; this has been agreed with the technology's developers. Furthermore, the quantitative study was a pilot study and therefore not appropriately powered to demonstrate statistical or clinical significances. The potential conflicts of interest that arise in regards to coordinating the trial of the monitor and the phenomenological exploration of the nurses 'world' are fully acknowledged later (see p128).

6.4 Qualitative research design

Lewis (2003) proposes a number of criteria that should be met to develop a good research design. It should have a clear purpose, coherence between research questions and methods/approaches should be evident, data generated should be valid and reliable, whilst simultaneously considering the practical issues such as, time, money and the reality of the research setting. Crotty (1998) suggests that we take a pyramid-like approach to tackle our research design. This way we ensure that we have all the correct research elements in place, carefully allowing us to explore each level of the pyramid – making certain that each level of the pyramid is accurately related to each other and not solely being compared with each other, the arrows indicate the relationship of the levels, not the direction of the choices made.

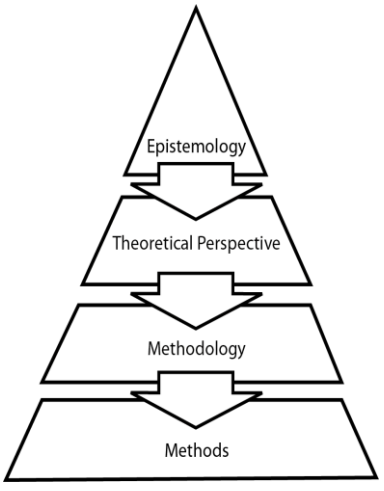

Figure 6: Pyramid of research design (adapted from Crotty 1998)

By this he suggests that you start by choosing your method of enquiry as this will instantly govern your methodology choice. Thereafter the theoretical perspective that informs your methodology will be uncovered and finally leading to your epistemological perspective, which is the tip of the pyramid. In contrast, Koch (1999) suggests otherwise, stating that it is the researcher's ontological position that will inform the epistemological inquiry which will then lead to the choice of the most appropriate methodology. The variance in the approaches causes much confusion and the researcher, perhaps naively, had hoped there would be a more structured and less ambiguous way of finalising her inquiry process. As a novice researcher in the area of qualitative work, it left her feeling anxious and questioning whether she was pursuing the correct pathway. The structure outlined in this doctoral thesis does not accurately reflect the 'real' process the researcher adopted. In essence, Crotty's (1998) process was followed; identifying the method of inquiry first. The researcher wished to interview the nurses in the intensive care unit and this is what guided the inquiry process. However, the researcher felt it abstract and confusing to begin the research design explanation with methods and work back to the ontological and epistemological stances in this doctoral thesis, and does not reflect the layout of published research literature either.

6.5 Ontology and Epistemology

As a novice qualitative researcher these concepts were confusing and difficult to grasp, yet appear fundamental necessities when embarking upon qualitative research. Even Crotty (1998) acknowledges the confusion often caused by the terms and thereby deals with ontology as a completely separate issue, outside the pyramid of research design itself. Although the researcher has developed an appreciation of the terms and the importance they hold in ensuring a clear and unambiguous pathway for qualitative research it posed an intellectual challenge.

6.5.1 Ontology

The ontological orientation is concerned with the question of "What does it mean to be a person?" (Koch 1999 p21). In the case of this research study, the question would be 'What does it mean to be an intensive care nurse?'. The nurses are being asked to tell their story and the story they tell is what it is like to be in *their* 'world' and this

must be accepted as how they construct their world, even if it differs from how the researcher constructs their own but the researcher had to make an interpretative analysis of the participants' world. The 'world' of the intensive care nurses can only be understood if we seek to stay close to their experiences (Smythe et al. 2008). In order to gain understanding of the intensive care nurses' 'world' the research study endeavours to find out what it is like to be an intensive care nurse at the outset. Smythe et al (2008) nicely summarises ontological orientation as approaching research in such a way as to want to "illuminate the process as it is lived" (p1390).

6.5.2 Epistemology

Epistemology is concerned with 'knowing'. For this research inquiry, it means 'How do the nurses know what they know?'. What has happened in their lives and careers to inform their 'knowing'; the nature, scope and sources of their knowledge. The belief is that there are several ways of knowing what we know. As alluded to earlier the position adopted in regards to 'knowing' will have a direct impact upon the theoretical perspectives taken thereafter. Crotty (1998) describes epistemology as "providing a philosophical grounding for deciding what kinds of knowledge are possible and how we can ensure that they are both adequate and legitimate"(p8). The researcher was not alone feeling that the notion of epistemology felt slightly abstract and did not fit well with qualitative research. Becker (1996) acknowledges that epistemologies traditional preoccupation with how qualitative research 'ought' to be done has led to it overlooking 'how' research is actually done. Therefore epistemology has had to undergo a transformation to keep up with contemporary research "giving up preaching about how things should be done and settling for seeing how they are, in fact, done" (p54). The 'how' is more important than the 'ought' as Becker (1996) asserts, it would be naive to think otherwise because research methods are 'formed' by the researcher using them

"A lot of energy is wasted hashing over philosophical details, which often have little or nothing to do with what researchers actually do... researchers work these positions out in practice. What researchers do usually reflects some accommodation to the realities of social life...Their activity thus cannot be accounted for or explained fully by referring to philosophical positions" (p57)

Despite reservations of its place and value in qualitative research epistemology remains a necessary consideration for the time being. There are considered to be three main epistemological stances, each with varying views of human knowledge, how we obtain that knowledge and how we use that knowledge. The three common stances are objectivism and subjectivism and constructionism, and despite none 'fitting' for phenomenological enquiry for completeness the researcher has considered them all.

Objectivism

Objectivism holds the belief that *all* phenomena exist regardless of whether or not we know they exist, whether we have physically encountered them or personally experienced them (Crotty 1998). The theoretical perspective, positivism, employs the objectivism approach and therein is most commonly used in quantitative research methodologies and methods and used to inform empirical and scientific research (Crotty 1998). Koch (1999) asserts that objectivism "works with binaries: nature and culture, reason and purpose, means and ends, intellect and sensibility, object and subject" (p25). The researcher has rejected the objectivism position as the nature of this research study is concerned with people's experiences and specifically their 'lived' experiences, wishing to know what their experiences have been and how they feel about them. The researcher's choice is supported by Koch (1999) who asserts, that this stance is no longer even viable in current qualitative work.

Subjectivism

This approach believes that knowledge and perceptions of phenomena are both subjective and relative (Wilson 2000). Unlike objectivism there is belief that there are multiple realities available (Wilson 2000), subjectivists would claim that all knowledge is merely a matter of personal perspective and Guba (1990) states that this epistemological approach "is intimately related to the values of the inquirer" (p24). Crotty (1998) claims that the use of this approach to understand the everyday meanings people apply to things, can make understandings inferior to scientific understandings, and this means that their truths cannot be affirmed. Brown and Harris (1979) defend the use of subjectivism in their study of depression, they claim that subjectivism is criticised for not delivering a "universally acceptable set of public

criteria" (p610), yet this is exactly what makes a subjective approach 'subjective'. Researchers using this approach must accept that what respondents believe to be the defining and significant reason for their feelings, even if this goes against proven empirical evidence and is not verifiable, it is the respondents truth and must be accepted as so. Notably, during the researcher's 'epistemological exploration' it was that there is often little debate of subjectivism and sometimes only objectivism and constructionism are alluded to. This is perhaps indicating that it is less favourable in qualitative research.

Constructionism

Within the arena of epistemology, constructionism rejects the two other main epistemologies; objectivism and subjectivism. Constructionism believes that there are many different social constructs which define individuals realities compared with objectivism, where it is believed only one reality exists, and subjectivism where realities are deemed limitless and unique to the individuals. Constructionism works on the assumption that "(t)here is no meaning without mind" (Crotty 1998 p8). This stance views the individual as a " '*sense maker'* in that each of us seeks to understand or make sense of our world as we see it and experience it" (Darlaston-Jones 2007 p20). Our realities as we live and breathe them are socially constructed by the experiences we have, the opinions we hold and the beliefs and truths we support. The world that we have been born into and actively live in is highly dynamic, socially constructed, a product of social choices and decisions that determine by their own understanding, and interpretation of such constructs who the individual becomes. This explains why knowledge and meanings held differ from individual to individual even for the same phenomena. Constructionism contends there are only 'useful' interpretations to be discovered not solely 'true' and 'valid' (Crotty 1998).

A phenomenological orientation

This study examines and explores the intensive care nurses' 'worlds'. Specifically their clinical decision making in relation to sedation management, including sedation holds, and their experience of using a new novel sedation technology, the responsiveness monitor. Therefore the pursuit of the research study was to unveil the "often implicit or hidden" (Finlay 2011 p111) meanings in participant's narratives of

their experiences of each of these, arguably, entwined issues. The adoption of a phenomenological orientation asserts that understandings are neither objective, subjective or merely socially constructed, but that it is the context of the participants' life situation and projects that brings real understanding and significance to their descriptions (Finlay 2011). Furthermore this approach accepts that interpretations of narratives will "arise out of the research context which involves a meeting of persons in a particular, situated, shared space" (Finlay 2011 p113). It is, as Finlay (2011) succinctly describes, the empathetic attunement of a "shared, embodied, intersubjective space" (p113), from which interpretations and thereafter shared understandings arise. Each nurse interviewed had a unique experience of technology and sedation management, drawn from their nursing experience. The changes to current sedation management have been adopted by each nurse differently and it is these unique experiences that are of interest. The context of their experiences, as the findings suggest, have has implications for the interpretation of their narratives. In addition, the use of the responsiveness monitor to manage their patients' sedation will be entirely novel. Therefore the perceptions and beliefs of the nurses 'world' have been interpreted set within the monitor's clinical trial, and hence short term, use.

6.6 Theoretical concepts and perspectives

The theoretical perspective chosen provides the context of how the researcher intends to embrace the methodology chosen and how the interpretation of the data generated will be approached and also driven by the methodology chosen.

6.6.1 Interpretivism

Theoretically the research design is based on interpretivism, whereby the reality of the study can only be understood from the perspective of the nurses undertaking the study (Crotty 1998). The concepts and themes will be derived from the accounts given by the critical care nurses based on their experiences of sedation, sedation holds and the responsiveness monitor. This theoretical perspective, according to Crotty (1998) "looks for culturally derived and historically situated interpretations of the social life-world". The adoption of interpretivism for the purposes of this study works

on the basis that, as Weber (1968) proposed, interpretive understanding 'verstehen'[9] and explanation are being sought. However, according to Benner (1994) it is more powerful to understand than explain because "it stands more fully in the human world of self-understandings, meanings, skills, and tradition" (pxv). Interpretivism is characterised by the ontological assumptions that reality is complex, holistic, and context dependent (Monti & Tingen 1999). This concurs with Benner (1994) who writes that the understandings sought through interpretivism consider "historical change, transformations, gains, losses, temporality, and context" (pxv). The study has aimed to understand the nurses' experience of the recent changes in sedation practice, the implications these have had for the reality of their daily nursing practice. Furthermore, it has explored the implications of the responsiveness monitor for their 'world', seeking to elicit the reasons for their unique experiences and attitudes in using it to assist them in making clinical decisions. Interpretivism is bringing forth what the researcher(s) understands by the text generated with the research participants. It involves saying this is what I gather is going on and what I take it to mean, in essence communicating "what the storyline is" (Koch 1999 p 27).

6.6.2 Hermeneutics

An aspect within interpretivism is hermeneutics. Hermeneutics, Greek in origin, means "to interpret or to understand" (Crotty 1998 p88). Initially the focus of hermeneutics was concerned with interpretation of religious and ancient texts. Nowadays the focus has turned to all texts. Therefore within the theoretical perspective of interpretivism, the aim is to interpret and understand the experiences elicited. *Hermeneutic* interpretivism is, in simple terms; a guideline to interpret these experiences in a particular way. Hermeneutics is a way of understanding human social life; it is the bringing of understanding to text that is according to Geanellos (1998a) the "heart of the hermeneutic endeavour" (p154). In order to endorse hermeneutics, a commonality between the text and the reader must be present. This is ideal for this study's circumstances, in regards to the researcher's affinity with

[9] Verstehen: There is no direct translation of this term into English language. It refers to understanding the meaning of action from another's point of view. It is entering into the shoes of the other, and adopting this research stance requires treating the other as a subject, rather than an object of your observations. Individuals are seen to create the world by organizing their own understanding of it and giving it meaning. Heidegger refers to this as Dasein's 'openness to the world'.

intensive care as a former intensive care nurse. Crotty (1998) highlighted that it is "…a link between the two that makes the exercise [hermeneutic interpretation] feasible" (p91). This by no means suggests that the researcher's interpretation of the nurses' experience has taken precedence. Far from it; hermeneutics attempts to 'delve' much deeper than the 'author's' understanding alone. In fact, Crotty (1998) suggested that this approach has the capability to seek out the unknown, hidden meanings that may be, from a distance, easily overlooked or missed. Farnell and Dawson (2006) used the hermeneutic process in their study exploring new nurses experiences of ICU, highlighting that their previous experience as intensive care nurses assisted them in understanding and interpreting their participants experiences. This reciprocal process is supported by Spence (2001) who states "...understanding derives from personal involvement..." and Gadamer (1960) asserts that it informs the "ontological structure of understanding" (p293). Furthermore, it is possible that through the use of hermeneutic inquiry, a deeper awareness of the nurses' 'world' meanings has been elicited than they were able to vocalise in their own words (Crotty 1998). Heidegger (1962) stressed the importance of embracing our past experiences when adopting hermeneutic interpretation, he wrote "an interpretation is never a presuppositionless apprehending of something presented to us (rather) interpretation will be founded especially upon fore-having, fore-sight and fore-conception" (p123). The largest misuse of hermeneutics is, when researchers omit to lay bare their "preconceptions, biases, past experiences" (Plager 1994 p72) or how they successfully addressed these in their research, particularly their interpretation of texts (Geanellos 1998b). These are explored further under the Heidegger polemic (see p104). However, the researcher has endeavoured to overcome such recognised and real biases affecting her interpretation with the use of a researcher diary wherein preconceptions, thoughts, opinions and expectations have been recorded and used to aid the reflexivity process vital in this research inquiry. Indeed, as the researcher declared in Chapter 1, her writing style in the third person was chosen to ensure that the nurses' voices reflecting their 'world' was heard and not overshadowed by the researcher's.

Importantly, it is worth bearing in mind that, readers may not agree with the author's interpretation of the data but, they should be able follow the way in which the author

came to it (Vivilaki & Johnson 2008). The process of interpretative hermeneutics offers the readers a different perspective and understanding, in such a way as Koch (1999) neatly says will "the researcher hopes illuminates a phenomenon, uncover an interest, or sensitize a health care practitioner to respond in a different or more appropriate way" (p28). It is a way of bringing forth interpretations of other's 'worlds' to unveil aspects of these worlds which may otherwise go unnoticed, and encourage reflection upon the way in which the reader sees their 'world' and the 'world' of others with whom they interact.

6.7 Methodology

6.7.1 Phenomenology

Embedded within the theory of interpretivism lies phenomenology, both regarded as a theoretical perspective and a methodological approach. Long debated, there appears to be an uncertainty as to its true location. Arguably it sits well in both, according to the context of its use (Taylor 1995;Wimpenny & Gass 2000). The researcher chose, for clarity, to refer to it under the methodology heading. This study has chosen a phenomenological approach to inquiry. The reasons for this choice will be made explicit by the researcher, as will the reasons for not adopting an alternative methodological approach. The rejection of other approaches reflects the researcher's pursuit of the nurses 'lived experiences' and that there is sparse literature around the decision making and sedation practice of ICU nurses and therefore pre-formed theories to guide inquiry were not possible.

Phenomenology is described as an inductive, descriptive research method (Vivilaki and Johnson 2008). Phenomenological inquiry believes that an individual's true

"Behaviour cannot be understood apart from the meaning he or she makes of his or her own experience and such meaning is accessible when the individual reflects on the constitutive factors of personal experience" (Attinasi 1990 p3)

In support of using this approach, Vivilaki and Johnson (2008) state that, if the research question is related to human experience, the phenomenological approach would be invaluable and effective in gathering data. Keen (1975) highlighted the uniqueness of this research methodology stating

"…unlike other methodologies, phenomenology cannot be reduced to a 'cookbook' set of instructions. It is more an approach, an attitude, an investigative posture with a certain set of goals" (cited in Hyncer 1985 p279),

and according to Harman "Phenomenology means a way of staying true to what must be thought" (2007 p155). The outcome of phenomenology is not to create theory, per se, but to allow the investigator and thereafter the readers, an insight into the lived experience of a phenomenon (Corben 1999); in this case, the ICU nurse's 'world' and the phenomenon of sedation management and utilisation of a (new) sedation monitor. Phenomenology does not look to provide 'law-like' statements or produce any 'causal certainty' about the phenomena under inquiry. Rather is seeks to illustrate the different human experiences as they are *lived* by different individuals (Van der Zalm & Bergum 2000). Spiegelberg (1978), provides, arguably, a rich description of phenomenology; stating

"[It] is a moving philosophy with a dynamic momentum, determined by its intrinsic principles and the structure of the territory it encounters, composed of several parallel currents, related but not homogenous, with a common point of departure but not a definite and predictable joint destination" (p1)

Simply, according to Mills (1994), the question that phenomenology asks is "What is the meaning of one's lived experience?" (p28).

6.7.2 The differing philosophical views of phenomenology

The complexities of phenomenology deepen as the differing ideas that philosophers develop as to how phenomenological inquiry should be carried out. Each boasting an abundance of writings reflecting their ideologies and notions of the 'correct' way to perform phenomenological research. Three key philosophers of phenomenology are Husserl, Heidegger and Gadamer. Each had strong beliefs that their notions were the most 'true'; enabling the most insight and unveiling of individual experience and 'world'. Interestingly, each had worked with each other at some point, and therefore unsurprisingly there are varying degrees of overlap noted between their writings.

6.7.2.1 Husserl and phenomenological inquiry

Edmund Husserl (1859-1938), a German philosopher, introduced his notion of phenomenology at the turn of the century, known as 'transcendental' phenomenology. A critical requirement of his phenomenological approach is referred to as 'bracketing' or 'epoche'. Bracketing means that the researcher must simply leave all their preconceptions, assumptions and beliefs 'at the door' of their interviews; "they shall assume a distance and objectivity at all stages of the research" (Lowes & Prowse 2001 p473). Only by so doing, Husserl contended, can the researcher discover the participants' true experience (Wimpenny & Gass 2000) and keep only the *'essence'* of the investigated phenomenon. If researchers are unable to abandon their presuppositions and adopt a detached position, then it will be impossible for them to declare an unbiased effect on the data gathered. The researcher of this doctoral thesis argues, as do others, that to abandon *'self'* completely is not only potentially detrimental to the data, but also impossible (Cooper 1999;Lowes & Prowse 2001). In regards to interview data, without bracketing, Husserl (1950) would maintain that the data gathered would be contaminated, that the researcher is unable to truly 'experience' the 'experience(s)' being studied. To free yourself of all presuppositions, or as Husserl (1950) describes, to sustain a totally "transcendent Ego" (p37) into nursing research, is, according to Lowes and Prowse (2001), "fraught with difficulties" (p474), and is a "questionable feat" (p474). The difficulties mainly appear to lie with the argument as to how one can take such an objective stance in an area of research (nursing) that views its self in a wholly humanistic light, often in the face of the empirical and positivistic scientific approach. Furthermore, the researcher has chosen to generate her data using interviews and Husserl's approach does not facilitate this, as according to Rubin and Rubin (2005) interviews build relationships and the only way to build this relationship is by "crossing the boundary from being an outsider to being an insider" (p86). Arguably, this cannot be fostered if the researcher is left 'outside' the interview? Indeed, Cooper (1999) goes so far as to assert that bracketing is "absurd" (p11). Husserl's approach is arguably more descriptive than interpretive; the latter is the researcher's chosen theoretical perspective as identified earlier in this chapter.

6.7.2.2 Heidegger and phenomenological inquiry

Husserl (1859-1938) notions of phenomenological inquiry preceded Heidegger (1889-1976) who was for a time Husserl's research assistant. Heideggerian phenomenology is also described as 'existential phenomenology' and 'philosophical hermeneutics'. Martin Heidegger rejects the concept of 'epoche' (bracketing) for phenomenological inquiry. He asserts that we are too much beings-in-the-world' to be able to achieve bracketing (Heidegger 1962). Heidegger espoused the idea that human beings always come to a situation with a story or pre-understanding, which is something that we cannot 'bracket' or eliminate (Heidegger 1962). Heidegger brought hermeneutics to phenomenology, to add meaning and interpretation to descriptions. Heidegger argues that the world and person are mutually-constitutive, each relying on one another to develop and inform understandings; the world forms an essential building block for people and vice versa. This thought complements the earlier discussion surrounding bracketing and interviewing in that, during an interview, the interviewer crosses the chasm and becomes an insider, part of the data being generated. Heidegger (1962) refers to human 'Being' as 'Dasein'[10] in his work, believing that "problems of being can only be approached through Dasein" (p27). Heidegger (1962) asserts that it is only "by having regard for the basic state of Dasein's everydayness, we shall bring out the Being in this entity" (p38). This contends that you have to be 'Being' in the world and have your own experiences to be able to grasp understanding of other 'Beings' experiences; it is an advantage for the researcher to have their own experiences and understandings and bring them to the data generation. The researcher believes this way the interpretations formed from the data generated are not abstract; they will have context and a dose of reality.

A criticism of Heideggerian phenomenology is, ironically, the main ideology that makes it different to Husserlian phenomenology; non-bracketing. Specifically, how can the researcher be sure that their presuppositions and preconceptions which they bring with them to the research inquiry process do not bias the interpretations made? There is much debate in the phenomenological literature around as to how this should

[10] Dasein (Da-sein): In literal terms this means 'Being-there' and in everyday usage it stands for the kind of Being that belongs to *persons* (adapted from Heidegger 1962 p27).

be done, but more importantly how this is done effectively and explicitly for the readers of the research (Geanellos 1998b). Heidegger refers to researchers having 'fore-having', 'foresight' and 'fore-conception'. Fore-having refers to the affinity, experience of the background practices of the 'world' they wish to interpret, in the case of this research study, the researcher's ICU nursing experience and knowledge of the sedation monitor. Foresight is deemed to be the views the researcher holds as a result of their background practices that will appropriately inform their interpretation. Fore-conception would be seen as the expectations and anticipated findings the researcher has already created as a result of her nursing and monitor experience (Geanellous 1998b). Although Heidegger notes that researchers' fore-having, foresight and fore-conceptions can realistically never be made fully explicit, there is an obligation in this type of research inquiry to demonstrate consideration of them, and how they were 'worked out' in order not to inappropriately bias the interpretations made. The researcher has outlined her fore-havings, foresights and fore-conceptions later in this chapter (see p120).

6.7.2.3 Gadamer and phenomenological inquiry

Hans-Georg Gadamer (1900-2002) was a pupil of Martin Heidegger and hence his work is influenced by Heidegger (Pascoe 1996). However, rather than an interpretive focus to aid understanding, Gadamer's work focused on understanding through what he termed historical awareness. He advocated the use of presuppositions and preconceptions to achieve understanding and meaning (Pascoe 1996). He believed that it is the pre understandings that allow us as researchers to have more opportunity of being exposed to the truth (Geanellos 1998b). Rather than seeking the meaning of the texts/narratives, Gadamerian inquiry seeks the content of the text "the interpreter (nurse researcher) becomes a mediator between the text and all the text implies but not the interpreter of what the author meant" (Geanellos 1998a p157). His work refers to this as the 'fusion of horizons' (Pascoe 1996), asserting that the fore-having, foresight and fore-conceptions held by the researcher are and should influence the interpretation of participants' narratives. Gadamer does not use the terms fore-having, foresight or fore-conception, rather he refers to them as 'prejudices'. The term prejudice is used differently from its usual negative connotations and merely means 'pre-understandings'. It is within these prejudices he

assumes that historical awareness is embedded. It is a shared historical, linguistic and cultural prejudice that allows interpretation (Geanellos 1998a). In this respect he argues that researchers' interpretations do not need to be checked with their participants as each individual will have a different interpretation due to their differing prejudices (Geanellos 1998a).

6.8 Alternative methodological considerations

The researcher has adopted a Heideggerian, hermeneutic, phenomenological approach, a 'science of interpretation' which assumes that daily decision making is fundamentally influenced by our collective life experiences. This study aims in part to explore differences between nurses' lived experiences in intensive care, which must assume use of personal knowledge and life experiences as an important part of the decision making process. Specifically this is the exploration of their sedation practices and how they manage the more wakeful ICU population following recent changes to sedation practices. This will include interpretation of their experiences working with the novel responsiveness monitor. It was felt to be the most appropriate and best fit to address the research inquiry. However, this approach is not exclusive to qualitative research, other methodological approaches were considered but were rejected and explored below.

6.8.1 Quantitative Research

This research study is addressing issues that quantitative research simply cannot deliver on and therefore was immediately rejected. The rich descriptions elicited from the nurses' interviews are not achievable through the use of statistical or binary collection and therefore quantitative research was deemed wholly unpractical and would ultimately fail to address the research aims.

6.8.2 Grounded Theory

A competing qualitative methodology for this research enquiry was that of grounded theory approach. This methodology is the discovery of theory that is embedded within the words and actions of the person(s) being studied (Goulding 2005). Wimpenny and Gass (2000) suggest the aim of this approach is to "through a process of constant comparison and reduction...to establish tight, well-integrated theory built from

well-defined concepts arising directly from the empirical research in hand" (p 1486). According Goulding (2005) this approach is suitable for any research that has an interactional element to it. Although not dissimilar to the notion of fore-structures or prejudices, grounded theory accepts the use of the researchers' life, professional and research experiences as an inevitable and irreversible part of the process. Glaser and Strauss (1967) suggest it is these experiences that should be used to help figure out what is "...theoretically possible or probable with what one is finding in the field" (p253). A number of things set grounded theory distinctly apart from phenomenology. Firstly, it is concerned with the development of theory whereas Heideggerian phenomenology is concerned with eliciting personal descriptions of experience. Grounded theory chooses to answer specific questions about social processes of interest to the reader (Wimpenny and Gass 2000). It can adopt a different approaches to generate data; qualitative interviews, observations and memos, in which it aims for a saturation of data. Furthermore, it uses an inductive coding strategy or line by line analysis of the narrative text (Goulding 2005), this begins by identifying key areas of interest and mapping these against narratives to find commonalities and then develop theory. The rejection of this approach was founded in view that it uses predefined areas of interest as the basis of exploration and analysis. This could have be potentially detrimental for this research study, causing the researchers biases, interests and knowledge to lead the research inquiry in an area of which there is little research evidence available. This may have led to a number of issues that were revealed being overlooked and/or ignored.

6.8.3 Ethnography

An ethnographic approach was considered, it comprises of extensive fieldwork; working with people in their natural settings (Goulding 2005). However, the nature of clinical decision making is a continuous process, with multiple decisions being made. The researcher was specifically interested in decisions relating to sedation practices and the sedation monitor of the nurses and therefore felt more in-depth and rich data could be gathered from retrospective interviews; questioning specific sedation decisions. Unexpectedly, and rather serendipitously, a form of informal ethnography did occur during the research inquiry. This was as a result of the researcher's role of coordinating the quantitative sedation monitor study as alluded to

earlier. In this capacity, the researcher, was privy to the interactions between the whole ICU nursing team and the monitor, and observed the interactions between the nurses; as described in the later findings chapter the nurses developed their own 'competiveness' when using the monitors and reducing the sedation being administered to their patients (see p222).

6.8.4 'Think aloud' technique

This technique encourages the participants to think critically and problem solve and allows thought processes and rationales to be verbalised (Lee & Ryan-Wegner 1997). It has been widely used in education and a method of inquiry used when studying decision making. When 'think aloud' techniques are utilised in natural settings they allow decision making to be captured prospectively, incorporating all the distractions and interruptions that may occur and allowing these to be reflected upon in terms of the decisions made thereafter (Aitken & Mardegen 2000). Aitken and colleagues (2008) used 'think aloud' techniques to establish the attributes and concepts used to determine sedation management, and the influence a sedation protocol had on their practices. Although a considered technique, the shifting priorities and multidimensional working of ICU nurses would have potentially meant the period of 'think aloud' would have been prolonged in order to capture a true reflection and picture of sedation management. In addition, in contrast to Aitken and colleagues (2008) this study intended to be descriptive and develop understanding, eliciting the 'world' and 'sedation world' of the ICU nurse. Although sedation is often given in a continuous form, sedation holds, a specific focus of the researcher's exploration, are a one-off daily event. The coordination of timing a 'think aloud' period around this would have been unpractical. Furthermore, in view of the perceived agitation and the distress elicited from the nurses managing such states it could have been unsafe, distracting and even stressful for the nurses. Arguably, it would also have failed to capture the rich descriptive narratives of what it was like for their 'world' focusing on the more practical 'why' decisions and failing to unpick the embedded fears and conflict that did emerge.

6.9 Method

As noted earlier, the chosen method was to interview research participants. Interestingly, the researcher's research background up until this point had been in quantitative research and hence the use of qualitative methods was a new and contrasting approach. In this respect the researcher undertook academic and intellectual research preparation in qualitative interviewing prior to beginning her research study.

6.9.1 Interviews

Interviews are the most commonly used qualitative research method (Mason 2002). Research interviews, in their purest form are simply; "an interpersonal encounter to obtain verbal and/or written information ….that is aimed at generating new knowledge on life experiences" (Fontanella, Campos & Turato 2006 p812). The use of interviews will enable rich contextual data to be formed. According to Fontana and Frey (2000), it is one of the most powerful ways in which we try to understand our fellow human beings. Rubin and Rubin (2005) describe interviews as "extending our intellectual and emotional reach plus satisfying our intellectual curiosity" (pvii). Interviewing is not a new or novel research method; in fact Gubrium and Holstein (2003) argue interview 'techniques' are used extensively in our everyday lives, and are largely taken for granted (Fontana and Frey 2000). Nowadays, we live in what is has been referred to in the literature as an "interview society" (Silverman 1997 p248), wherein as Gubrium and Holstein (2003) correctly point out, "internet chat rooms are now as intimate as back porches and bedrooms" (p27). What constitutes a research interview is discussed through the literature. Holstein and Gubrium (2004) describe formal interviews, research interviews, as "special forms of conversation" (p141) and Burgess (1984) suggests that "interviews are conversations with purpose" (p102). Arguably, conversations do typically both entail questions and answers with each individual waiting their turn to speak but qualitative interviewing is necessarily more complex than a everyday conversation. Qualitative interviewing, according to Rubin and Rubin (2005) requires specific and discrete, even quite sophisticated skills. It requires the researcher to "be able to hear the meaning of what people actually say and even more so understand the meaning of what strangers say" (p12).

6.9.2 Interview structure

Interviewing approaches are usually referred to as either structured or unstructured. However, Hammersley and Aitkinson (1983) argue that unstructured interviews are impossible; everything requires a certain amount of structure to perform a task. The necessity of structure is supported by Mason (2002), who describes interviews and conversations as requiring "at least the use of an informal style, a topic-centred/narrative approach – not a sequenced script just an idea of the themes that are to be explored" (p62); which points towards structure in some form. Collins' (1998) paper reflects upon unstructured interviewing and suggests that even the most unstructured interviews will be structured to some extent, proposing they will be "structured at a number of levels" (paragraph 1.3). As a phenomenological approach to inquiry has been chosen, the researcher used an aide memoir (Appendix 3) to prompt, but no more than prompt, the flow of the interview. Semi structured interviews are not suited to the phenomenological approach as they serve only as a constraint to the interview flow. The phenomenological purpose is to allow the interviewee to reconstruct their own experiences and reflect on the meanings they gave them (Attinasi 1990).

Importantly, the researcher performed pilot interviews to assist with the development of the aide memoir, allowing her to refine the prompts and topic areas. This is actually supported by Gill et al (2008) who suggest that through piloting tools you can make sure questions and prompts are clear and understandable – philosophy and pragmatism coming together.

6.9.3 Formation of information

Interviews are not 'excavations' but 'formations' of information. The term 'excavation' seems tough and hard; words perhaps more akin quantitative methodologies. There is a perceived feeling of rushing, desperation and frustration associated with this metaphor. Contemporary qualitative interviewing is more about constructions and reconstructions of information and knowledge, with the interviewer and interviewee working together to gain insight and deepen this knowledge. Kvale (1996) refers to an interviewer as a 'miner' seeking nuggets of essential meanings, stripping away the surface to reach deeper layers of meanings. Qualitative interviewing cannot be likened to an easy conversation with a close

friend, Mason (2002) asserts that good qualitative interviews are hard, creative and active work. Gubrium and Holstein (2003) neatly summarise the importance of interviews suggesting they teach us "about places we have not been and could not go and about settings in which we have not lived" and that they are an exclusive viewing of people's "interior experiences" (p27). Continuing this theme of unveiling, Rubin and Rubin (2005) suggest qualitative interviews should be viewed as "...night-vision goggles, permitting us to see that which is not ordinarily on view and examine that which is often overlooked but seldom seen" (pvii).

6.9.4 The art of interviewing

Interviewing therefore, is not simply a matter of asking people some questions and noting their answers. Interviewing is asking people to lay bare their feelings and experiences, which may not have been exposed before. Interviews may elicit truths never told and uncover unexpected themes. Reflecting on this, the researcher increasingly recognised increasingly this cannot be approached in a haphazard way but requires a cautious and considerate approach within which the research relationship between interviewer and interviewee is cardinal.

6.9.4.1 The art of phenomenological interviewing

Phenomenological interviewing should be neither structured nor unstructured (Smythe et al. 2008). A structure would "freeze the phenomenological spirit" (Smythe et al. 2008 p1392) and no yet no structure would imply the researcher having no understanding of why the exploration of the participants 'world' was important. Phenomenological interviewing is therefore more an inter-play of openness between interviewer and interviewee. Hyncer (1985) argues that it is the bringing together of subjectivity and objectivity in this manner that enables the researcher to be more comprehensive in their findings and more faithful to the phenomenon being explored. Aide memoirs, consisting of probes and prompts, can be used to facilitate phenomenological interviews as the researcher chose to (Appendix 3).

6.9.5 The 'self' and interviewing

The use of 'self' is therefore integral in the phenomenological interview process and recognition of its implications for the data gathered noted. The impact of interviewer can significantly influence the interviewee during qualitative interviews. Hallowell

et al (2005) highlight the importance of acknowledging that "...with all forms of social interaction, research interactions are influenced by who we are, what we are, and how we appear to others" (p42). The influence of the interviewer should never be underestimated or ignored as it will affect the subsequent formations and any potential truths emerging from the interview. The researcher has interviewed her peers, ICU nurses, for this research study. The ICU nurses are known to the researcher in varying degrees both professionally and personally. The way in which they perceived the researcher could have potentially affected the depth of insight into their 'world' they revealed. Assumptions and opinions could differ depending upon how well the ICU nurses know the researcher *and* what they of the researcher. The researcher also recognised that she would consciously and sub-consciously interacted differently with certain ICU nurses interviewed due to the nature of her personal connection with some, but also in view of how receptive certain staff usually were towards her and her role as a research coordinator in the ICU in which the interviews took place. For example, to highlight this, nurses can genuinely be interested in research and its benefits for their patients but equally others have (openly) expressed marginal irritation that it disrupts their routines and 'makes their bed spaces messy with equipment'. The researcher did not wish to have to exclude those nurses with whom she had personal and professional connections. Equally though, it was important that the researcher construct and elicited the same important and quality information from each nurse interviewed. Furthermore, the nurses' participation in the interviews was voluntary and could withdraw at any time as indicated in the information sheet (Appendix 6).

Phenomenological interviewing, specifically a Heideggerian approach, advocates the investment of 'self' in the interview process, but as long as the researcher can identify what their 'selves' are and how these may affect the interpretation of the interview data elicited. Oakley (1984) too supports the use of self, suggesting that it leads to more enriched information and builds a rapport between interviewer and interviewee,

"...the goal of finding out about people through interviewing is best achieved …when the interviewer is prepared to invest his or her own personal identity in the relationship" (p41).

This statement again re-emphasises the importance of 'open-ness' in phenomenological interviewing. In further support of a Heideggerian approach, Holstein and Gubrium's (2004) present the concept of the 'The active interview', arguing the difficulties interviewers have achieving a 'neutral interviewer' stance, *and* recognising the superior interview quality that can be achieved by rejecting it. Melia (2000) when interviewing intensive care nurses also had a background in intensive care and therefore could not adopt what she refers to as the "naive enquirer" role (p92). She argues the benefits of being a 'member' of the group being interviewed, that it is important to not only be able to follow the interview discussion but also to participate. Her work highlights the importance of being able to share anecdotes of their experiences of intensive care and asserts that engaging and demonstrating a grasp of the issues at hand is essential to successful interviewing in the ICU context. McEvoy (2001) also reflects on this idea stating that an affinity with the area of research "enables the researcher to read in between the lines of what is said" (p50). Although caution must be exercised, as Miller and Glassner (2004) recognise "an interviewer who presents him-or herself either as too deeply committed to those interests…restricts which cultural stories interviewers may tell and how these will be told" (p125). This concurs with the researcher's earlier appreciation to make explicit and be aware that the nurses interviewed *may* perceive the researcher to have a vested interest in eliciting a particular tenor of response. Funder (2005) implies that to prevent this we should always make clear who we are to our interviewees, acknowledging and recognising what our pre-understandings, whilst equally accepting that this will open the doors to others biases and misconceptions. A similar outlook on researcher bias was made by Lowes and Prowse (2001), who stated that in the case of Heideggerian phenomenological interviewing, as is proposed by the researcher, bias is not only unavoidable but perhaps *also* desirable.

6.9.6 Gender discourse

Discourses of gender are arguably inescapable during the interview process (Alex & Hammarstrom 2008). In all honesty, the researcher had not considered that gender would be an issue for her interviews, although in retrospect the researcher recognises that by mere chance more male nurses had agreed to participate in the interviews than she had anticipated, though not entirely surprising considering the literature

which suggests that male nurses are more 'attracted' to areas such as ICU due to their technical nature (Dassen, Nijhuis, & Philipsen 1990).

6.9.7 Professional role conflicts

As noted earlier the researcher coordinated the quantitative trial for the introduction of the sedation monitor which ran congruently with this study. This raised concerns that her professional role as a researcher coordinator, and her researcher role as a doctoral student may potentially conflict. Inevitably the researcher had invested considerable time educating the nurses as to the use of the sedation monitor, including supporting them in its use in their daily nursing practice. Therefore the researcher was alert to the fact that the nurses interviewed may feel she had a vested interest in the sedation monitor's success and thus feel less likely to discuss dislikes about, or criticisms of the monitor. In addition, it is impossible to escape the fact that just as the researcher will enter (purposively, as in the case of Heideggerian phenomenology) an interview with presuppositions and preconceptions so will the interviewee. As Taylor (2005) states "the way participants respond to questions may be influenced by perceptions of the role and status of the interviewer" (p42).

6.9.8 'Favourable answers' during interviews

According to Bourdieu (1977), a weakness of qualitative interviewing is that people will undoubtedly want to tell you what should have happened, what they think you want to hear rather than what actually did happen. In the case of this research study, the insight revealed about a nurse's world may be very much dependent upon feelings of trust, confidence and comfortableness in the presence of the researcher in order for them to feel able to speak openly and honestly. This is of particular importance if they feel their stories or opinions may reflect less than ideal nursing practice or perhaps even implicate fellow colleagues. Britten (1995) shares the anxieties of Bourdieu and uses the example of doctors as interviewers and patients as interviewees, suggesting that participants in such circumstances "may wish to please the doctor by giving the response he or she thinks the doctor wants" (p252).

6.9.9 Interviews and power

As previously acknowledged interviews are a powerful method of gathering data. Nonetheless, it is the power relations formed within the interviews themselves that requires attentiveness from the interviewer. The power dynamics that will inevitably form in interview situations (Nunkoosing 2005) can directly impact upon the information the interviewee will share. It is claimed that the interviewer must be aware of the position of power they hold, Carr and Kemmis (1986) state, "the researcher determines the object of the study, the research question, the actions observed, the method of observation and not only what is observed but also its significance" (cited in Crowe 1998 p341). What is more, Briggs (1986) points out that as the interviewer we also have the power over the subsequent circulation of the gathered interview knowledge. Wengraf (2001) stresses the importance of these points by adding that the implications of power are "dangerously likely to be overlooked by well-intentioned interviewers" (p45). Unfortunately power can easily be translated into manipulation and quickly become unethical. Alex and Hammarstrom (2008) highlight the severity of power 'gone wrong' due to lack of situational awareness, "Despite the best intentions, the interview situation may be experienced as, and may in fact be, a form of abuse" (p170). Effective interviews, as already mentioned earlier involve the development of a rapport, but it is within this rapport that power can potentially breed. Power is demonstrated by the ease in which rapport is built, but mainly in the fact that the interviewer has the power to complete, finish or abandon the rapport (interview) as and when they wish. Kvale (2006) compares interviews in their darkest form to "seductive forms of manipulation" (p481). Equally, the interviewee can also be in possession of the power; they have the information that the researcher requires and without them and their collaboration in the interview data could not be gathered. A person agreeing to participate does not mean that they are committed to laying bare their 'world' there may be many reasons why a person may be (unconsciously or consciously) unwilling, guarded or obstructive to the interview process. Nevertheless, Hallowell et al (2005) demonstrates through a number of vignettes that sometimes it is not "always necessary or desirable for interviewers to be in control" and moreover that many surprising and useful data can be gathered from interviews in which this is allowed to occur (p118).

6.9.10 Peers and power

The professional identity of the researcher/interviewer will undoubtedly be a cause of this shift in power dynamics or 'power asymmetry' as described by Kvale (2006). A common reference to power asymmetry is the doctor-patient relationship, but as Chew-Graham (2002) and colleagues remind us, this is not the only power relationship available. Within the context of research this relationship could also be doctor-researcher or doctor-doctor. Similar issues were recognised by the researcher whilst interviewing fellow nurses for the research study. It may be that the interviewer will be viewed as the 'expert' in the interview relationship, a concern the researcher had when the interviews turned to discussions around the sedation monitor. When in actual fact the researcher very much viewed the nurses as the 'monitor experts'. Although the researcher had the technical and practical knowledge about the set up and running of the monitor, its implications and use-ability in clinical ICU nursing practice could only be understood and experienced by the nurses themselves.

Bedside logs

A bedside log (Appendix 4) was completed by all the ICU nurses when using the sedation monitor, not exclusively to those participating in the qualitative interviews. The nurses recorded every time they made a sedation assessment in regards to the management of their patient's sedation. The log requested the nurses fill in discrete variables: time, RASS score, the colour the monitor was presenting (Green, Yellow or Red), but also asked them whether they agreed or disagreed with the practice change the monitor was suggesting. The nurses were also asked to record their rationale for their concordance or discordance with the monitor's suggestion. Although Lewis (2003) suggested that logs are a useful tool for retrospective questioning, these logs were developed entirely independent of this doctoral study. However, they did, in fact, serve to enhance the 'data responses' from the nurses interviewed. The nurse logs were kept and maintained by the bedside nurses and not the researcher and drew upon 'real' and recent events to describe their decision making processes. The researcher and nurse, when applicable, referred to the bedside logs to facilitate illustration of specific decision making scenarios that had been encountered during their nursing span of duty.

6.9.11 Interview transcription

Whilst undertaking a preparatory course, the researcher had had the opportunity to attempt some interview transcription and did begin transcribing the first nurse interview. Although the process was laborious, the researcher felt it was a useful exercise and provided insight into the difficulties of interview transcription and encouraged the researcher to reflect upon her interview approach and how best the transcription should be formatted. It stressed the importance of ensuring the recording was clear and their 'lived experience' was heard. However, the researcher found her transcription typing skills to be slow and in view of ensuring timely analysis of the interview data, sought the assistant of a transcriber who transcribed the remainder of her interview recordings. The researcher now appreciates, not only the time involved but also the costs of transcription services and the importance of accounting for these at the outset of a qualitative research study.

6.10 Achieving study rigour

Rigour and qualitative research is a long debated, particularly the *demonstrating* of rigour. Unlike quantitative research there are no statistical techniques to account for confounders, or any statistically significant outcomes (Milne & Oberle 2005). Rolfe (2006) highlights the challenges, proposing that the pursuit of a 'quality' consensus around qualitative research will likely fail because "…there is no unified body of theory, methodology or method that can collectively be described as qualitative research…" (p305).

6.10.1 Rigour

Rigour implies demonstrating the validity, reliability and generalisability of a research study. However, the concepts of validity and reliability need to be approached differently when applied to qualitative research and should be viewed as trustworthiness and dependability. Generalisability of qualitative research appears a contentious issue, seemingly having to work twice as hard to prove the applicability of its findings.

Trustworthiness and Dependability

According to Sandelowski (1993), to avoid being led inappropriately down a positivist path, researchers should seek to demonstrate validity in terms of

trustworthiness rather than truths. In qualitative research, according to Cohen and Crabtree (2008), the concept of validity "requires understanding beliefs about the nature of reality" (p334). In terms of this research study, this is being done from an interpretivism perspective, wherein the lived experience of the research participants is sought. In order to achieve trustworthiness (validity) the researcher should generate "a meaningful account of the complex perspectives and realities studied" (Cohen and Crabtree 2008 p334).

It is further suggested that rather than 'reliability' being addressed, that the term used should be 'dependability', however the processes involved in achieving reliability/dependability are not favoured by all (Sandelowski 1993). Demonstrating the dependability of qualitative research is equally as important as the trustworthiness (validity). The researcher throughout the research inquiry should affirm their findings and interpretations. It is suggested that this can be done formally and informally. A formal method often described in the literature is that of 'member checking'. 'Member checking' of qualitative data appears to be held in differing regards in the research literature. The appropriateness of such a process is influenced by the theoretical perspective being adopted (Sandelowski 1993). Some authors strongly advocate its use in qualitative inquiry (Guba & Lincoln 1989) to ensure that the data collected has been analysed correctly, whereas others argue that two different researchers will never interpret narratives in the same way due to their differing presuppositions (Sandelowski 1993). The researcher chose not to have the interview interpretations peer reviewed or return the transcripts to the nurses interviewed. The researcher felt this process to be abstract and, concurring with Sandelowski (2002), did not fit well with the notions that underpinned the researcher theoretical perspective, phenomenology. However, to ensure validity and reliability of the findings, the researcher drew upon the informal discussions and questions as a result of presenting her developing doctoral findings (see Appendix 11) and used this as informal validation of her findings through the discussions and questions these generated. These opportunities also acted as a process of reflexivity which allowed the researcher to hear other people's views and describe their experiences. It also provided the opportunity for alternative points of views to be considered by the researcher. Despite not engaging in a 'member checking' process, the reliability of

the researcher's findings have been strengthened by her affinity with the ICU setting (McEvoy 2001), the intense engagement with her interview data, and the non use of computer analysis software described later, (Smythe et al. 2008), the accuracy in the recording and transcribing facilitated by invaluable pilot interviews, discussions with fellow researchers whose research took place in similar settings, and the repeated listening to recordings alongside the verbatim transcripts.

Generalisability

The generalisability of a study is the extent to which its findings are transferable to other populations. Phenomenology is often criticised and considered 'weak' for generalisability purposes. Sampling is usually purposive, meaning that participants are specifically selected to fulfil the needs of a study (Saunders 2003). Yet, this is viewed as less problematic if findings are compared with "similar people, settings and times" (Johnson 1997 p290). This in essence strengthens the researcher's sample which included both inexperienced (novice) and expert nurses ensuring her findings are transferable to a wider population of ICU nurses. Furthermore, researchers, in order to help their readers decide whether the findings are transferable to their own population and setting, should make explicit their study's sample size, the diversity of the sample, how the sample was selected, the context of the research setting, their relationship with the 'researched' and the data collection and data analysis methods adopted (Johnson 1997, Saunders 2003). Each of these is addressed by the researcher later in this chapter.

To further strengthen the rigour, trustworthiness and dependability of the study data, particularly as the researcher was a 'novice' in the qualitative world, as noted earlier, the researcher undertook research courses in qualitative interviewing; developing skills and awareness of the implications of interviews. According to Angen (2000) preparation such as this in qualitative interviewing is essential to the credibility of the research and Sandelowski (2002) agrees suggesting it is fundamental to any qualitative research study.

6.10.2 Reflexivity

The notion of reflexivity assists in achieving rigour in qualitative studies, as Jootun et al (2009) state it "…adds credibility to research and should be part of any method of qualitative enquiry" (p42). Reflecting on decisions, being explicit about ones dilemmas will, according to Finlay (2003), offer "a research history…as both a confessional tale and a transparent account of the research" (p4). According to Jootun et al (2009), reflexivity is central to the use of qualitative methods and Fontana (2004) describes it as an attempt "to identify, acknowledge, and do something about the limitations of the research, which may impair the emancipatory goal of the inquiry" (p99). It is defined as

"...the continuous process of reflection by the researcher on his or her values, preconceptions, behaviour or presence and those of the respondents, which can affect the interpretation of responses." (Parahoo 2006 p326-327).

Reflexivity involves researchers recognising that they are part of the social world under study. This may be colloquially expressed as 'easier said than done'; it requires the researcher to "turn a critical gaze towards themselves" (Finlay 2003 p3), and nobody is fond of criticism, let alone self criticism. Finlay (2003) strongly encouraged its use, maintaining that, nowadays it should not be a matter 'if' we need reflexivity but 'how' do we do it. She also believes it can be used in three ways, as a confessional account of methodology or exploring personal (possibly unconscious) reactions, as an investigation of the researcher-researched relationship dynamics or to reflect on how the research is socially positioned (Finlay 2003). Conversely, reflexivity is shrouded in some negativity. It has been regarded naively, as simply a way of justifying "excessive self-indulgence in academic work" (Plummer 2001 p207), but Hycner (1985) sees it is a good practice as the process in itself may bring to light personal presuppositions the researcher was not even aware of. For the purposes of this Heideggerian phenomenological exploration, reflexivity is essential, particularly in consideration of the researcher's prior ICU nursing experience and in her role as research coordinator.

The researcher, using a reflective technique, has outlined her fore-having, foresight and fore-conceptions in Table 5 below.

	Recognised presuppositions	Potential bearing on interpretation
Fore-havings	1.Clinical experience as a critical care nurse (four years)	1. The researcher's nursing experiences influencing her interpretations
	2. Previous research experience and interests in technology and nursing experience	2. The researcher has personal and professional interests in the use of technology amongst ICU nurses. Her findings from this earlier work may influence her interpretation of the nurses perceptions of ICU technologies
	3. Has worked within a research role, in the ICU in which the research study took place, for eight years	3. The researcher may make assumptions due to her affinity with the ICU *or* the nurses interviewed may assume she already has certain knowledge or understanding wrongly - affecting the information they offer during the interviews
	4.Has been actively involved in the development of the sedation monitor	4.Bias towards generating positive information from the nurses
	5. Trial coordinator of the single-center sedation monitor trial which included delivery of practical training and education package.	5. The nurses interviewed may assume that the researcher may only wish to hear positive comments about its use and influence on their practice. Nurses may adopt a 'helping' role in the information they offer during the interviews. The nurses want to give the researcher the 'right' answers.
	6. Part of a small group assisting with the development and implementation of a delirium assessment tool in the named ICU	6. The nurses will assume an incorrect knowledge base of the researcher – affecting the information they offer during the interviews *or* the nurses may perceive the researcher to be in a position of power.
Fore-sights	1. The informal feedback from the nurses through current coordinator role was that the monitor appeared to assist them in reducing their sedation	1. Avenues of exploration during the interview may be influenced to elicit more positive than negative information from the nurses interviewed.
	2. The researcher was acutely concerned about biases due to dual-role; affecting the interview process and interpretation of narratives	2. Extra effort to ensure both positive and negative narratives were elicited. Laying bear dual-roles as a doctoral student and not a researcher coordinator role prior to the interview commencement.
Fore-conceptions	1. The researcher thought the monitor would more likely work than not work in reducing sedative use	1. Ensure that the probing of the interviewees was unbiased during the re-reading and listening of the transcriptions. Present interpretations in a balanced and fair fashion; not assuming anything

	2. Concerns that the nurses may just view it as a another piece of technology they have to look after	2. Ensure that the nurses 'true' perceptions are elicited, listening carefully to their responses about technologies in ICU in general and using these as a contrast to their perceptions of the sedation monitor technology
	3. Anticipated that staffing would arise as an issue	3. Ensure to not ask leading questions re staffing and not be overly empathetic towards this concept in the interpretations or letting personal feelings regarding it lead the interpretation.
	4. Anticipated some conflict issues between nurses and doctors	4. Ensure to capture the non-verbal gestures to illustrate these. Consider the view the nurses held the 'researcher' in terms of the interpretation.

Table 5: Researcher's fore-havings, fore-sights and fore-conceptions

The researcher kept a research diary and field notes throughout the course of her research study. Jootun et al (2009) argues researcher diaries "raise awareness of influences on their [the researcher's] interpretation often data and their relationship to the research topic and participants" (p43), this concurs with Smith (1999) who equally advocated its use in raising researchers' self-awareness. The researcher began a researcher diary shortly after the quantitative study began. This captured personal and ICU nurses initial feelings and behaviours specifically surrounding the sedation monitor arrival in the ICU. It encouraged potential biases that formed regarding the monitor to be recorded and acknowledged and the researcher was able to take this 'awareness' to the nurses interviews when they began. Field notes following each interview were kept, the researcher wrote these as soon as possible after the interview and certainly within twenty-four hours of the interview taking place. This strict time period was applied by the researcher and allowed non-verbal gestures that the raw interview recording could not recognise to be recorded. In addition, the researcher recorded if the interview had been subject to any interruptions and any information which related to the personal and/or professional relationship with the interviewee. Lastly, the researcher noted personal feelings about how each interview had gone. This aimed to explore whether the interviewee seem relaxed and if not why not, how confident the researcher perceived their interviewee's answers and descriptions, particularly around 'controversial' and/or unexpected issues that arose. A record of their nursing experience was made and the researcher used this to reflect upon their 'lived experiences'. The researcher's diary enabled the researcher to prospectively

and retrospectively reflect upon the quality of each interview, which was integral to the notion of phenomenology and also to the development of researcher's qualitative interviewing skills.

6.11 Setting and sample

6.11.1 Setting

The general intensive care unit (ICU) in the Royal Infirmary of Edinburgh is an eighteen-bedded unit, and the setting for this study and from where the sample of practising critical care nurses was drawn. The ICU is a mixed medical and surgical unit. This ICU was chosen as it was the exclusive setting of the quantitative study of the sedation monitor and the researcher's place of employment.

6.11.2 Access

The familiarity with the ICU was inarguably of benefit to the researcher's study particularly in the gaining of access to participants and the ICU environment. As a current National Health Service (NHS) employee in ICU, the researcher had access to the ICU location and nursing staff. Permission to undertake this study had been granted by the Critical Care Clinical Director, Professional Lead for ICU and the Clinical Nurse Manager. A record of all the nurses who had received training on the responsiveness monitors' was kept; this was performed in accordance with Good Clinical Practice (GCP) guidelines and a requirement of GE Healthcare. All nurses who received the training were invited to participate in the interviews each receiving a participant information sheet (Appendix 6). The nurses were offered up to twenty four hours to consider their participation; although not all required this time. Informed consent (Appendix 7) from the potential interviewees was subsequently sought, and a suitable time for the interview to take place arranged.

6.11.3 Sample

Sixteen practising ICU nurses were interviewed. Twenty nurses had been the sample size intended but due to both due to the unpredictability of the ICU environment and the fixed time scale of the quantitative study in which the sedation monitors were being trialled, this could not be achieved. However, on reflection the researcher felt that following completion of the thirteenth interview many of the same notions and

concepts were being repeated by the interviewees and therefore does not feel that the inability to recruit twenty participants was detrimental to her research inquiry.

There are approximately 120 ICU nurses working differing hours (full-time/part-time), shift patterns (day/night), and with varying degrees of ICU nursing experience working within the chosen ICU setting. The concept of expert has been long debated (Benner 1984a), drawing on the Dreyfus model of skill acquisition to determine five levels of nursing proficiency; novice, advanced beginner, competent, proficient and expert (Benner 1982) as described earlier (see p73). Despite the long standing debates of 'non-expert' and 'expert', the researcher has had difficulty determining what the cut-off point, in terms of years experience and knowledge acquisition in ICU, for 'non expert' and 'expert' nurses. This is particularly so, as it is not explicitly obvious in the literature. Benner (1982) suggests,

"...experience is not the mere passage of time or longevity; it is the refinement of preconceived notions and theory by encountering many actual practical situations that add nuances or shades of differences to theory" (p407).

Consequently, a pragmatic approach was adopted by the researcher using a purposeful sampling method. Purposeful sampling strengthens a qualitative research study according to Ayres (2007), as the participants will provide specific, rich information, chosen by the researcher for their experience of a phenomena being investigated. All nurses who had received the responsiveness monitoring training and had had a minimum of twelve hours clinical experience using the responsiveness monitor were invited to participate in the interviews. This time frame was deemed as, not only realistic in terms of the number of nurses trained versus sample size proposed by the randomised control trial before it commenced (approximately 100 patients), but also would ensure each nurse has had adequate experience of the responsiveness monitor. Furthermore, an increase in the hours of monitoring experience was deemed potentially detrimental to the recruitment process in consideration of the nurses shift patterns. There were equal numbers of male and female nurses recruited and the ICU nursing experience of the nurses interviewed ranged from three months to eighteen years. This 'mixed ability' sample, 'non-expert' and 'expert' ICU nurses, prove advantageous to the research study, offering

insights into 'worlds' with different knowledge and experience and therefore different decision making approaches.

6.11.4 Eligibility criteria

Inclusion:

- Registered Nurse, employed by NHS Lothian University Trust and works within general intensive care unit; Ward 118, Royal Infirmary of Edinburgh
- Must have received training on new responsiveness monitor; theory and practical
- Must have at least 12 hours experience using the unblinded monitor in clinical practice
- Consent obtained to be interviewed and digitally recorded

Exclusion:

- Agency nurses, bank nurses, student nurses and/or nurses not employed by NHS Lothian University Trust
- Nurse who had not completed the required responsiveness monitor training; theory and practical
- Nurses with less than 12 hours unblinded monitor experience in clinical practice
- Where consent for digitally recorded interview not obtained

An eligibility criterion that was later reviewed after the recruitment process began was that the nurses must have been working with new responsiveness monitor within 24 hrs of interview taking place. However, it was decided that this criterion was too restrictive for this time limited research, and due to the unpredictable nature of the ICU environment was found to be unnecessarily hindering the recruitment process.

6.11.4.1 Selection bias

The researcher invited all nurses who had received the theory and practical training for the responsiveness monitor to participate in the interviews. The researcher

recruited nurses sequentially as they gave consent to participate, thereby reducing the risk of bias as the nurses were not being individually chosen by the researcher. The timing of the interview itself was driven by the availability of the nurses during their span of duty, which tended to fall in the afternoons. This required consideration of both the activity in the ICU itself and the clinical condition of the nurse's specific patient.

The issue of incentives

Incentives were considered when recruitment difficulties were encountered; the researcher considered monetary incentives in terms of either a voucher or taxi fares home for those nurses who lived in Edinburgh if they remained behind after their nursing shift to be interviewed. This was explored as the researcher encountered some difficulties, due to the changeable ICU environment, staffing levels and patients to find a mutually agreed and safe time for the bedside interviews to take place; prompting consideration of performing the interviews after the nurses had finished their nursing shift. The literature argues that incentives such as these may introduce bias so they must be used cautiously (Thompson 1996). However, following the review of the eligibility criteria, mentioned earlier recruitment became easier and incentives were not necessary.

6.12 Time Frame

The use of a timeline whilst performing research enables the researcher to lay out the structure of their research proposal from start to finish. It ensures they consider each step of their proposed research study in an ordinal fashion it is also useful to build in non-research factors such as personal holidays. Essentially a visual timeline aids time management and the general organisation of a project (Keele 2011). The researcher's timeline, as a Gantt chart, is below:

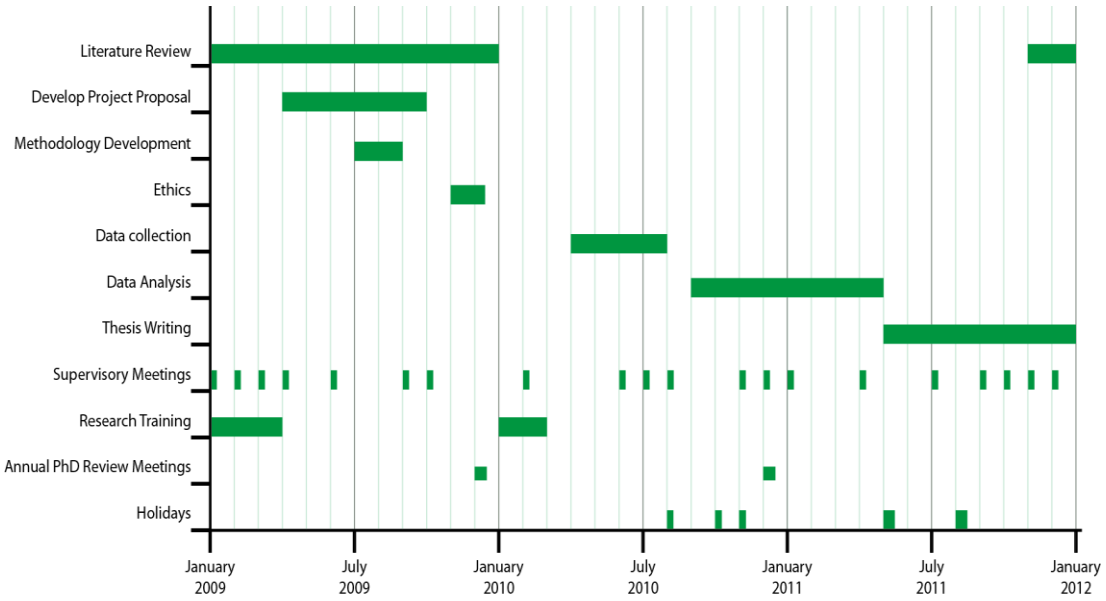

Figure 7: The researcher's proposed timeline presented as a Gantt chart

The researcher acknowledges that she had to be flexible with the initial timeline, at times it has frustratingly fallen behind the scheduled time, during her analysis process for instance and yet, at other times certain process occurred quicker than anticipated, for example ethical approval.

The researcher began the qualitative interviews two months after the quantitative study had begun. This time frame was chosen to enable as many nurses as possible to have received responsiveness monitor training and to have accumulated experience in its use, but without the monitor having become over familiar. The interviews took place in the ICU at the patient's bedside. The afternoons, as alluded to already, were the most appropriate time for the interviews as the mornings in the ICU tended to be occupied with medical ward rounds and clinical interventions. A degree of flexibility was necessary; as the workload of the ICU nurse was unpredictable, interviews had to be postponed. This influenced the researcher's decision, described earlier, to be less restrictive in regards to the time period that had elapsed from the nurses using the monitor. Furthermore, in order not to compromise patient care, a fellow nursing colleague or a member of research staff observed the patient during the interview period to attend to any patient needs or to monitor alarms. It was anticipated that the interviews last a maximum of one hour. In fact the interviews ranged from twenty minutes to forty-five minutes. If the nurse had deemed that their interview was

becoming detrimental, or potentially detrimental to their patient's care the interview was ceased or paused, and if necessary re-arranged for another time. This was fully explained in the information sheets given. Irrespective of these potential interruptions, the researcher favoured the bedside approach it facilitated contextualisation and allowed the nurses to keep events fresh in their minds, reducing difficulties with recollection. According to Lewis (2003), there is a risk of "deterioration…problems with recall, distortion and post-event rationalisation" the longer the delay between accessing study participants and the 'event' of interest occurring (p53). Keeping the interview experience contextual meant it remained 'real' and present.

Environmental factors

The researcher had some concerns about the noise within the ICU setting, with all its many audible alarms, affecting the recording quality and discussed this with a fellow doctoral student who had already completed a number of ICU bedside interviews and listened to some short excerpts of their interviews. The clarity of the interview recordings was good and the background noise did not affect the sound quality or distract from the interviewee's narrative. This was also a point of reflection for the researcher, following a conversation with the interview transcriber. The transcriber was unfamiliar with the ICU environment and commented how noisy it sounded. The transcriber was astonished that the researcher had been able to focus, and not become distracted by all the alarms and other noises that she had found difficult to 'zone out' whilst typing the transcriptions. Interestingly, the researcher had been so immersed in the interviews and undoubtedly this coupled with her familiarity of the ICU environment, that the noises had not been a distraction at all during the interviews. However, re-listening to the interview recordings during the analysis the researcher could understand how the background ICU noises were potentially distracting for other listeners.

6.13 Ethical considerations

6.13.1 Ethical committee approval

The research study was reviewed by Scotland A Research Ethics Committee. It was given a favourable opinion pending further information and clarification being given regarding some minor sensitive issues, which the research provided and changed as necessary in the study paperwork (Appendix 12). Scotland A Research Ethics Committee specifically deals with research involving adults with incapacity. Although this qualitative study did not directly involve any contact with ICU patients the researcher submitted to this committee on the advice of the Coordinator of the committee. This doctoral study was associated with a quantitative study already reviewed and approved by this committee and deemed to possess pertinent background information for this study's rationale. The committee approved the study after the conditions they had stipulated were met by the researcher (Appendix 12).

6.13.2 Conflicts of Interest

For the purposes of clarity and to ensure that there are no conflicts of interest, the researcher is at pains to declare that she has no shareholding or financial interest in GE Healthcare, the monitor's developers, and would not benefit financially from any subsequent profits that might be made by GE Healthcare a result of the responsiveness monitor research study. However, GE Healthcare had assisted with the funding of the researcher's doctorate work, and therefore the researcher acknowledges that this may be viewed as a conflict of interest, particularly with regard to the outcome of the quantitative study. This raised questions about what would happen should the findings of the qualitative research demonstrate difficulties. Equally, as mentioned earlier in the text, the researcher had been involved in preliminary work with the responsiveness monitor in preparation for the quantitative trial. This could be construed as conflicting and raises the concern of bias and prejudice. However, the researcher's study stands alone and separate from the quantitative study's outcomes. The funders have also outlined in their 'Study Plan' that the results of this qualitative work *can* and *will* be published separately and irrespective of the quantitative study's outcome (Appendix 13). This is because the

quantitative study was a pilot study and had not been statistically powered to demonstrate conclusive evidence about the outcome variables.

6.13.3 Informed consent

Informed consent is central to the ethical conduct of research and to gathering good quality data in social science (Crow et al. 2006). Participants must be able to make a decision based on sufficiently full information and have the opportunity to decline or withdraw without any effect to them personally or professionally (Crow et al. 2006). Potential participants must feel that they can comfortably say 'no'. Information sheets were given to nurses who had received responsiveness monitor training. Information sheets should be clear and concise. Crow and colleagues (2006) describes an interviewee's experience of information sheets as them becoming "bored with lengthy accounts of the research as a preamble" (p90). Therefore the balance has to be struck between the heavily regulated, but necessary, information requirement and not boring or deterring potential participants with laboured minutiae. A minimum of twenty four hours was offered to the nurses, which allowed them to consider their participation and discuss with others. Adopting this approach has been regarded as ethically beneficial to research, by avoiding any sense of being persuaded and giving the (potential) participant time to have confidence in their decision and ideally feel interested and engaged (Crow et al. 2006). As mentioned earlier none of the nurses took twenty four hours to consider their participation.

Although the researcher did not encounter any sensitive issues arising during the interviews, it was axiomatic that anonymity and confidentiality of the data generated was assured. The consent form (Appendix 7) clearly requests consent from the nurses to enable direct quotes from their interviews to be used in the thesis and future publication, with the safeguard that these quotations will be anonymised. Permission for the interviews to be digitally recorded was also obtained. How interview quotations are reported requires transparency on the researcher's behalf. The interviewees may feel very differently about the use of their words if they are recognisable in print or represented in a negative light (Dale 2006). The researcher has been explicit about the purpose and potential outcomes of the research study.

This, according to Crow and colleagues (2006), is essential to make participants feel comfortable.

6.13.4 Data Storage

The confidentiality of all data collected, processed and stored for the purposes of the study has be maintained in compliance with Good Clinical Practice (GCP) guidelines and the principles of Data Protection Act 1998. Participants enrolled into the study were assigned a unique study number on all digital and typed forms of data, including transcribed data to ensure anonymity. A file of study numbers linked to participants identifying information has been stored separate from other data, including consent forms. All written data has been kept in locked filing cabinet and all computer data was password protected. The data will be kept for a minimum of five years as local research policies dictate.

6.14 Data Analysis

Approaches to data analysis from qualitative research is wide and varied (Colaizzi 1978; Giorgi 1970; van Manen 1990; Gadamer 1960). It is acknowledged by Hycner (1985) that it can be a daunting task for novice qualitative researchers, and Thorne (2000) describes analysis as "the most complex and mysterious of all of the phases of a qualitative project" (p68). The researcher concurs. One thing that struck the researcher when exploring the various means of analysis was the struggle that qualitative researchers had offering a structure to the process; mainly due to an acknowledged fear of it being likened to an empirical scientific process. Yet, in order to formulate understanding and meaning, a process with a beginning and end was required, a structure of sorts. Rather ironically, the researcher suggests, was the discovery that the process of qualitative analysis in the literature more often than not was ordinal in presentation.

In general, many of the approaches had commonalities but differed in the way in which interpretations were formed around the phenomena of interest depending upon the theoretical perspective the researcher had taken (Flood 2010). The researcher reflected on her disappointment when commencing her analysis, that despite her enthusiasm and immersion in the interview data, the interpretations did not come

freely leading to a feared sense of 'writers block' for a number of weeks, unable to articulate the many interesting and revealing findings. Smythe and colleagues (2008) appear to recognise these frustrations and refer to Heidegger's passion for philosophy being motivated by 'personal being' and that it is the researchers 'being' (reading-thinking-writing) with their data which enables insights and interpretations to be made, this might suggest that the secret to achieving writing "is the gift of large spaces of undistracted time and the willingness to trust that emergence will come" (Smythe et al. 2008 p1395).

6.14.1 Phenomenological analysis

The researcher has adopted a phenomenological approach to her research which according to Hallett (1995) should not be used alongside a framework for analysis as this will transform it to a method rather than philosophical approach. This confused matters even further for the researcher. According to van Manen (1990) phenomenological analysis "... involves a process of reflectively appropriating, of clarifying and of making explicit the structure of meaning of the lived experience" (p77). The researcher must accept that the meaning of phenomena never one-dimensional and it is through continuous reflection of 'lived experiences' or through the "reflective activity of textual labor" (van Manen 1990 p78) that interpretations be made and understandings be offered. In essence there is no specific framework to use for the hermeneutic phenomenologist to adopt. Van Manen (1990) encourages the researcher to draw upon their own experiences, interviews and/or observations of phenomena/participants and the available phenomenological literature, and then perform a thematic analysis of the data generated to unveil interpretations and thereafter offer understandings. The researcher has endeavoured to do this by laying bare her fore-having, fore-sights and for-conceptions as revealed in Table 5. In fact 'understanding' depends upon the researcher recognising their pre-understandings and that 'Beings' can never be a neutral in their understanding and interpretation as that would require Beings (researchers) to stand outside their current understandings. Essentially this latter stance, from a Heideggerian position, runs counter to the "basic structure of our being-in-the-world" (Finlay 2011 p53). However, such pre-understandings *can* be marshalled in order not to over shadow the narratives and this is where the importance of the hermeneutic circle lies. The marshalling of such

understandings is achieved by using the embedded fore-understandings to provide a "rough and ready approximation" (Finlay 2011 p53). Thereafter this moves forward by being open to new insights and revelations that emerge which will potentially challenge the fore-understandings and offer the opportunity for new understandings to be formed. This process is called the hermeneutic circle (Figure 9); moving between the parts of understanding held and the 'whole' understanding' being formed. Standing (2009) describes the hermeneutic circle as "A continuous process of interpreting lived experience and reinforcing or revising perceptions about oneself and others" (p22). It is the nature of this back and forth process or circular motion, the interplay between parts and whole, that fosters fuller understanding of the area under exploration.

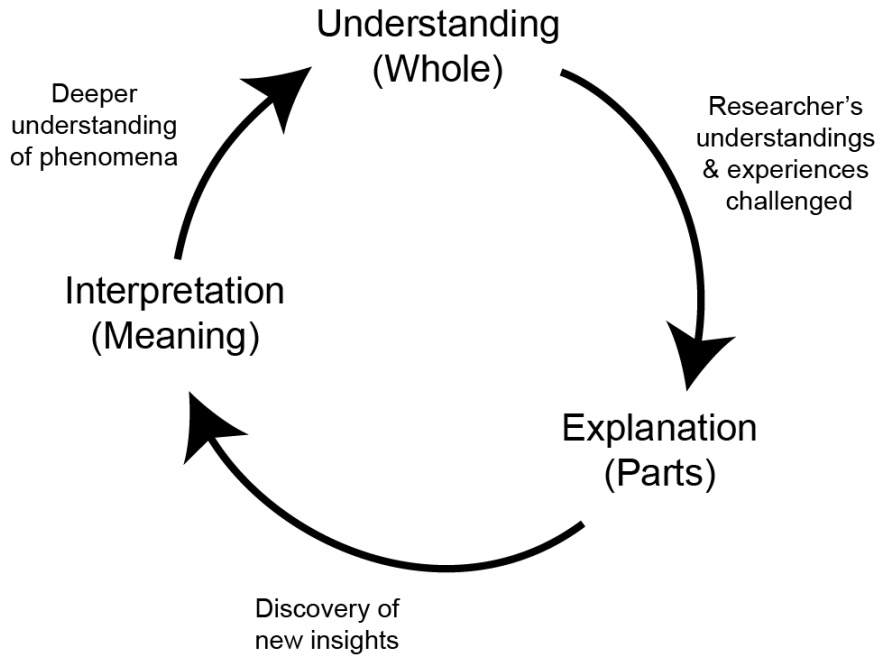

Figure 8: The Hermeneutic Circle

6.14.2 Theme formation

During the analysis of the interview narratives, the researcher reflects how she often felt constantly burdened by fellow researchers enquiring 'So what themes have emerged?'. Confused and anxious, the researcher tried to describe that she did not really refer to them as 'themes' per se, that they were more notions and understandings that she was going to offer to her readers. The researchers' 'theme dispute' was as a result of her phenomenological readings, wherein themes in a sense

made it feel as though the individual's 'lived experience' and 'world', in which she was fortunate to be given insight, were then all being grouped together; making them appear less unique and individual. However, the researcher learnt through the narrative analysis that it is both impractical and difficult not to group the understandings that emerged through her interpretations. According to Smythe et al (2008) they are "impressions gained" and an "an offering of thinking" (p1396). Van Manen (1990) writes extensively about the concept of 'themes'. He describes the use of themes as exploring what the "point" of the narrative offered is and simplifying this for the readers (p87). He argues the need for themes to assist us to make sense of lived experiences; it is about being insightful of the meaning of others 'worlds' (van Manen 1990). The researcher concurs that although a theme will ultimately have to be a distillation of the full and deep meaning, the development of themes gives the interpretations and understandings being offered 'shape'. The researcher, immersed in the interview narratives and having worked with the insights and understandings for a long period of time, will have gained a comprehension and 'feel' of the data that will and arguably cannot be felt by the readers. However, it is the researcher's role to ensure that, in a much shorter time frame, that they share their 'findings' and that they are "readable and alive" (Koch 1999 p27); this is the role of a 'theme' in the researcher's understanding. It is a way of ensuring that "something that matters significantly, something that we wish to point the reader towards" (Smythe et al. 2008 p1392) is highlighted and communicated. The researcher, although if honest, not entirely comfortable with the word 'themes' within the phenomenological context, and despite much consideration of the topic, was unable to propose a better 'term' and has opted to use 'theme' as the descriptor in this doctoral work. On reflection, the researcher now appreciates that the immense amounts of data gathered during interviews requires to be presented in a logical and understandable way for the reader, just as quantitative research is. Arguably though, qualitative data fits less comfortably within the 'logical' approach and theme formation softens the ordinal edges. There is too much data to clearly illustrate important issues in qualitative findings on an individual basis, where they might perhaps lose their potency and most certainly lose their reader. The reader will find a tabulated summary of the research study's emergent themes in Chapter 8 (see p274).

6.14.3 Analysis frameworks

The researcher, unable to find an analysis framework to which she felt truly fitted her analysis, and bearing in mind Hallet's (1995) assertions, has adapted the framework of van Manen (1990) to guide her analysis process. It is fundamentally important that readers of research can clearly follow and understand how the analysis was approached, and how the findings evolved (Thorne 2000). The framework for the phenomenological analysis of this study has the following steps:

1. Narratives of each nurse's 'lived experiences' of their ICU 'world' elicited through qualitative interviews performed by the researcher personally, seeking a 'sense' of the whole experience.
2. Verbatim transcription of each interview.
3. Each interview recording was listened to a minimum of three times whilst simultaneously reading the transcribed texts. The researcher's diary (Jootun et al. 2009) for each interview was supplemented with any additional thoughts and feelings that this process added that had been omitted in the initial writings; phenomenological reflection (Standing 2009).
4. The transcripts were re-read and significant phrases and statements in each were highlighted and additional comments written in the transcript margins.
5. Reflection of the highlighted phrases and statements occurred, wherein the researcher asked the question 'What could this mean?'. Any non-verbal communication during particular phrases taken into account, for instance, laughing and voice lowering.
6. The 'themes' presented as a result of the 'understandings' revealed were organised into groups of themes (van Manen 1990). This provided signposting for the reader.
7. Shared meaning of the themes that emerged were compared and contrasted.
8. An exhaustive description of the themes was then presented. Incorporating all the dimensions revealed of the ICU nurses 'lived experiences' of sedation management.
9. Discussion of the fundamental themes that had been elicited including consideration of the implication of these findings. Koch (1999) refers to this as "Telling and selling the story" (p27).

6.14.4 Data analysis software

In the initial stages of developing the research inquiry it had always been the researcher's intention to use a qualitative computer software package during the analysis. This did not prove to be the case despite the researcher undertaking research preparation on the use of NVivo[11]. The researcher's naivety prevailed during the infancy of her analysis, thinking that the NVivo software would do the analysis and 'magically' throw up themes and interpretations from the interview narratives fed into it. Honesty demands the researcher to admit to being disappointed in the discovery that what was described as a 'data analysis' software was merely, in her view, a data management system. However, the researcher did make attempts to use the software to manage her interview narratives at the outset but grappled with the system and found it an abstract and strangely divorced process. Phenomenological inquiry is deeply descriptive; the researcher is encouraged to become immersed in the data, in essence be 'living and breathing' it; exploring the multiple dimensions of the phenomena, and the understandings that can be sought and offered as interpretations of them. Somehow the software discouraged this, making the narratives appear alien and encouraged working in a constrained structured way, finding common words amongst transcripts rather than letting the narratives within the transcripts unveil and reveal ideas and themes through reading, re-reading and listening to the interview recordings. It prevented the researcher from "dwelling" (Smythe et al. 2008 p1395) with the data that had been formed. The researcher ultimately, found it more 'real' to use, perhaps more laborious, manual approaches, such as post-it notes, highlighting sections and making notes in the margins of the transcripts. This way the researcher facilitated easy recall, irrespective of the anonymisation of the transcripts, which nurse belonged to which interview narrative, at which bed space the interview had taken place, the body language of the nurse and other contextual issues pertinent to each interview.

[11] NVivo: A qualitative data analysis computer software package. It is designed for qualitative researchers working with very rich text-based and/or multimedia information who require deep levels of analysis on small or large volumes of data. It allows researchers to organise and analyse non-numerical data.

Saunders (2003) concurred with the feelings of the researcher she insisted that the use of manual analysis "...facilitated [her] continued immersion in the data" (p295). At first the researcher was anxious about her lack of 'software approach', greeted with 'gasps' and looks of confusion from fellow researchers when explaining she had chosen not to use it. However, on reflection the researcher would blame her lack of confidence at this stage of the research process for this anxiety about her decision. Notwithstanding the usefulness of software packages such as NVivo, the researcher is aware that her dataset, sixteen interviews, was small and therefore manageable in this respect compared to research projects with more data, wherein management data would be essential and not manageable 'manually' perhaps. Furthermore, the researcher also gained a sense of personal ownership of the data gathered by not 'handing it over'. This can be linked with Carper's (1978) notion of 'knowing, particularly the aesthetic and personal aspects described in the literature review (see p11). The researcher's 'dwelling' with the interview transcripts and immersion developed her understanding of the nurses experiences revealed and enabled the researcher to more effectively engage with their 'world'.

6.15 Potential research outcomes and benefits

This research study has provided a greater understanding of the decision making processes of nurses within the arena of critical care, particularly technology and sedation management. It has offered insights into nurses' reasoned response patterns and feelings of concordance/discordance, and opinions of technology. Such insights necessarily impact on the effectiveness of technological interventions in ICU and ultimately on the patient outcomes. Currently compliance with sedation holds, part of the Scottish Patient Safety Programme (SPSP), is poor. This study has revealed insight into the perceived barriers hindering the performance of sedation holds in practice and offered an alternative view of how these have manifested. Furthermore, and most importantly, proposed suggestions to how these could be approached in order to improve the experience of sedation for patients and ICU staff.

6.16 Dissemination

In the first instance, the findings will be of interest to both nursing and medical staff working in the participating ICU. Furthermore, the different perspective offered

regarding the patient safety approaches and the 'gaps' revealed that are currently impeding its acceptance and implementation may be of interest to the national bodies driving these changes. It is anticipated that a number of publications in both nursing and medical journals will be pursued following analysis. The researcher is acutely aware that the results of the trial require to be communicated to the appropriate and relevant audiences to share new knowledge and this will be born-in-mind when selecting where work is published and presented in the future. Weiss (1979) supports this statement, stating that the efficiency of communication links are imperative to make sure the best and most relevant research reaches the people faced with the problems. Lastly, this research will undoubtedly be of interest to the funders, *GE Healthcare*. The results of this doctoral work have been used to form the basis of a multi-centre quality improvement project, described in more details in the 'Future Directions', chapter 9.

6.17 Summary of chapter

This chapter has aimed to demystify the methodological process and research design issues the researcher has chosen to use for this research study. It is hoped that it clearly demonstrates and defends each process of the research inquiry and enables the reader to understand the choices that the researcher made. The process of qualitative research is far more 'woolly' than the quantitative research which the researcher had prior experience with. The researcher admits feeling slightly cynical of the reflexive processes that seemed deeply embedded within this type of research and naively began by viewing them as 'pointless extra work'. However, it is now obvious that the process of reflexivity is essential and the researcher diary and field notes are irreplaceable throughout the process but particularly in the final stages of writing up the thesis. Without them the theoretical stance underpinning the research would have struggled to maintain any merit or trustworthiness as many feelings of the researcher would not have been captured and their potential effect on interpretation of the narratives not considered. The researcher has presented a clear and concise description of the processes made in selecting the study's sample, time frame and analysis. The researcher's affinity with and professional credibility within the ICU undoubtedly assisted with her selections and access to the ICU setting. Yet,

this was the researcher's first qualitative study and this in itself posed new challenges and frustrations which she has attempted to lay bare. There are issues surrounding conflicts of interest as a result of the researchers professional role and it is hoped that the researchers honesty surrounding these have alleviated any anxieties surrounding the influence(s) this may have had on validity of the study. Inarguably, the researcher's professional role facilitated the study process. The process, or 'non-process' of analysis as seems to be advocated by many authors, was most certainly one of the largest challenges for the researcher. The conflicting literature and vast ways of approaching qualitative analysis caused anxiety. The researcher's 'novice-ness'[12] to qualitative research led to her initially develop a fear of rejecting the orthodoxy and feeling confident in adapting a number of analysis frameworks to assist with her analysis. Following support and guidance from her supervisors these fears were dispelled. As long as the reasons for choices were explicit and were not the complete antithetical of the chosen theoretical perspective, most approaches were possible. It is hoped that the researcher's choices are clear, justified, and more importantly perhaps can be understood by the reader.

[12] Novice-ness: Used in keeping with Heidegger's (1962) use of 'ness' e.g. 'everyday-ness' and 'throw-ness'

Chapter 7: The Findings

This chapter will report the findings from the nurses' interviews. The nature of qualitative research, including phenomenological enquiry, is such that a vast amount of data is acquired (Pope, Ziebland, & Mays 2000). Making sense of this data is one of the greatest challenges of qualitative research (Priest, Roberts, & Woods 2002). The findings chapter has been divided into five sections, unveiling the five main areas: The nature of 'intensive care', Technology in ICU, Sedation in ICU, The responsiveness monitor's implications for sedation practices and finally Experiential learning and clinical decision making. This approach has been chosen to clearly illustrate the different aspects of the intensive care nurses 'world'. It will begin by bringing to light what intensive 'care' means to the nurse's that work there, an important concept that will underpin many of the other themes that emerge in the four sections that follow. The technology chapter explores the ICU nurses' perception of ICU technology and examines how they embed it in within their nursing practice. The sedation chapter examines the changes occurring around sedation management and elicits the nurses' feelings about these practice changes. It demonstrates how their 'lived experience' as an intensive care nurse can potentially militate against achievement of optimal sedation and in turn affect patient outcomes. The fourth chapter investigates the nurses' experience of a new sedation monitor; the responsiveness monitor. The implications it had for their nursing practice emerge. In addition, the researcher explored the more practical issues, such as usability and acceptability with the nurses. The final chapter focuses upon the ICU nurses' experiential learning and clinical decision making in relation to sedation and in regards to the responsiveness monitor.

7.1 The Nature of 'Intensive Care'

7.1.1 Overview of chapter

To explore any aspect of intensive care nursing, the researcher deemed it essential to first uncover what intensive care actually means to the intensive care nurse, including their rationale for pursuing a career in intensive care. Essentially this unveils their 'lived experiences' of intensive care and gives a perspective of their intensive care 'world', that without, would mean only assumptions about their 'world' could be made. The meanings elicited underpin many of the other feelings and experiences that emerge during the exploration of the intensive care world; ICU technology, sedation and clinical decision making. Carper (1978) supports this, she says

"The body of knowledge that serves as the rationale for nursing practice has patterns, forms and structure that serve as horizons of expectations and exemplify characteristic ways of thinking about phenomena. Understanding these patterns is essential for the teaching and learning of nursing." (p13)

The nurses' describe needing to 'know' physiological and technological knowledge, particularly feeling technically safe, before they were able to develop their more empathetic knowledge. Today's nursing practice presents moral dilemmas for the nurses and they describe the difficulty they have balancing evidence based research and their perceptions of patient safety and comfort. Furthermore, the organisational constraints of healthcare settings appear to have an unassailable influence on their nursing practice. The researcher has adopted Carper's (1978) key patterns, as described in the literature review, to guide the findings of what it means to the nurses to be a intensive care nurse in this chapter but has included a more contemporary element , a socio-political perspective, identified by White (1995) relevant for current healthcare. It is argued that each of these elements is required in order to acquire the proficiency and skills of professional nursing.

7.1.2 The intensive care nurses world: the need to 'know'

The interviews began by the nurses considering their reasons for pursuing a career in ICU. An overwhelming theme of wanting to 'know' emerged:

"When you get the intensive care experience, you more or less know practically everything about nursing really..." (Interviewee 002)

As the interviews evolved it became clear that 'wanting to know' for these nurses quickly transformed in to 'needing to know'; often this was a result of the environment and the acutely ill patient mix that ICUs care for. ICU is a dynamic and fast moving area of healthcare, high intensity, and developing knowledge in this area often has to be as quick paced (Brown 1991).

7.1.2.1 Intensive care and empirics: the science of nursing

Empirical knowledge, deals with facts, it is objective with a focus on scientific knowledge; it is something firm with end points and answers. It was clear from the nurses that working in intensive care meant gaining significantly more knowledge about physiological functions of their patients and they wanted to build on their knowledge as a necessity in this technical environment. The nurses strived to acquire in depth knowledge of body systems and use this knowledge to benefit their patient related decision making and skills. The following nurse reflected how he would watch ICU nurses come and collect acutely ill patients from the general ward, he seemed in awe of the knowledge and skills they had, obviously beyond the knowledge and skills he possessed at that time:

"I had seen a couple of intensive care nurses on the respiratory ward picking up patients, 'packaging them up' to take them to intensive care, I was so impressed with what they could do..." (Interviewee 003)

He continued by describing that he wanted to gain greater knowledge of anatomy and physiology as he saw this as the means by which you could really 'care' for acutely ill patients, illustrated by those he had witnessed being transferred to ICU:

"...patient systems, respiratory, cardiovascular... just how to care for these patients" (Interviewee 003)

Similarly this nurse reflected on how out of her depth she felt in the general ward environment when a patient became unwell:

"I used to begin to feel a little…. that I didn't really know what I was doing when they got sick. So, I decided I should be competent in that, so I came to ITU to learn how" (Interviewee 004)

Achieving a level of competence was important to this nurse; competence implies the ability to provide better care. It is also perceived that there were more opportunities to be faced with very 'sick' patients in ICU, therefore giving her the opportunity to learn, but to learn in a much more controlled and supported environment. This nurse described that it was the attraction of understanding the changeable presenting disease processes of patients and the autonomy this knowledge would give her in her role as a nurse:

"It's probably the intensity of care, the immediate illnesses, the fact that you can see not only improvements fairly quickly but also deteriorations...You're more in touch with medical staff, you've got more input in the treatments; you've got more to do with the...medical equipment with your infusions and things like that" (Interviewee 012)

Intensive care nursing certainly provides the opportunity and the environment to learn immense amounts of new information. The sort of knowledge the nurses are describing here is controllable, factual knowledge, context free and objective.

7.1.2.2 Intensive care and aesthetics: the art of nursing

This is the aspect of nursing knowledge which is not gained as a result of scientific investigation; it complements it as the 'art' of nursing. The empirical knowledge appears to be the knowledge that the nurses are yearning for initially, the factual, physiological, technical knowing, to enable patient care, but with the acquisition of empirical knowledge the desire transmutes to prioritise, or reprioritise, aesthetic knowledge. The concept of being able to provide more satisfying care is illustrated by many of the nurses, many said it was the appeal of 1:1 care: one nurse looking after one patient. They suggested this care ratio allowed them to provide better care, they really got to 'know' the patient; leading to more satisfying care being delivered:

"You get much more support from your colleagues, much less to deal with in terms of things that are unrelated to patients so you get more time with patients, you can provide proper patient care, unlike on a ward where the staffing was so bad." (Interviewee 005)

This point is expressed time and again by the nurses:

"...a bit more hi-tech, maybe a bit more, 'involved', a bit more going on. You know the patients so much more in depth than you do on the ward" (Interviewee 008)

"I decided to come and work in intensive care because I really liked the critical care setting, I liked the patient contact with just having to look after one patient with my sole attention just on them..." (Interviewee 012)

Interestingly, all these nurses compare the ICU care with general ward care, where the nurse to patient ratio is markedly lower (Department of Health 2000aa), indicating they all had had ward experience prior to their ICU careers. This is an important point that is recalled later in the interviews in relation to the issues of dependency and technology. It also brings forth an interesting notion, that perhaps those nurses who have commenced their careers in ICU will lack appreciation of the essential skills of nursing without technology, and as such, arguably their empathetic nursing skills may be more technologically driven than those nurses who have only general ward base or low technology nursing experience.

It appears that, despite natural human caring capacities inherent in many new nurses, the 'art' of nursing develops over time, through nursing experience and then is maintained thereafter through the course of daily nursing experiences and decision making. Patients admitted to intensive care are often acutely ill with associated high morbidity. Their outcomes are often unpredictable, requiring the ICU nurses to demonstrate high levels of both empirical and empathic knowledge for both the patient and their family. Many would view ICU nurses as 'blessed' with a high nurse to patient ratio but the rapport they need to build may have to be rapid and sometimes short lived. In addition, it is expected of them to know their patients intimately and provide specialist effective care in view of this nurse to patient ratio. This is a notion that is explored further in a later chapter, as a source of tension between nurses and medical staff wherein nurses feel that their 'aesthetic knowing' of a patient is not recognised by the medical staff as an important acquired skill in their nursing practice or a valid source of evidence for decision making.

7.1.2.3 Intensive care and personal knowing

This aspect of knowledge is regarded as a pre-condition to building therapeutic relationships (Leenerts 2003). Personal knowledge requires the nurse to increase their 'self' awareness through either experiential knowledge 'being-in-the-world' and/or interpersonal knowledge as a result of interaction with others (Wong 1998). Once this knowledge is developed the nurse will be able to view a patient as a 'person' and not merely as a category of illness (Carper 1978) and the patient "matters" (White 1995 p77). It is this type of high quality interpersonal relationships

built between nurse and patient that are attributed to successful decision making (Jenks 1993). Personal knowing is also a particularly important feature for ICUs where technology often gets held responsible for destroying the humanity that this 'personal knowing' is supposed to foster (Almerud et al. 2008a). The following nurse expresses 'personal knowing' as she considers the family as part of the patient, and not just as an illness and remembering that, before their arrival in ICU, the patient had a life, knowledge that must be integrated into her nursing role:

"I think it is excellent that we can help people and families and patients you know, continue to live and continue to enjoy each other" (Interviewee 004)

Personal knowing encourages and requires the nurse to reflect on what they know and whether they do what they know. This component of knowing is noted as being a difficult concept for a nurse to efficiently translate into their practice leading the researcher to contemplate whether the participation in the interviews themselves has served as a reflective practice for the nurses involved. It allowed them to reflect inwardly and honestly talk outwardly about their feelings towards those unique patients and families experiencing intensive care and to consider their nursing care: what they professed and what they practised. Carolan (2003) argues that being given the opportunity to vocalise about an issue calls for reassessment leading to both the possibility of a new found enthusiasm or perhaps a more reflective and questioning approach being adopted.

7.1.2.4 Intensive care and ethics: the moral component

Moral knowledge can be challenging, as it is concerned with 'what ought to be done' and can at times be the opposite of what the empirical knowledge would suggest. In the literature review Wong (1998) offered an example of moral knowledge in action with regards to the palliative patient and their comfort versus protocol. In intensive care a patient's critical illness inhibits their involvement in decisions as they are often sedated, intubated and unable to verbalise their needs and desires. Management of ICU patients' sedation has posed a moral dilemma for the interviewed nurses, illustrated clearly in later chapters. Whilst they possess the empirical evidence for the benefits of sedation reduction for their patients it is the unknown short term consequences of agitation and distress and the visual discomfort their patients appear

to be suffering that governs their decisions. The on-going emotional labour (Henderson 2001) is to balance empirics (objectivity) and morality (subjectivity) in the best and safest interests of their patient itself compounded by the ethical knowledge of obligation of what 'ought to be done' (Carper 1978). This notion of obligation was elicited from the nurses' interviews and the following nurse succinctly demonstrates her dilemma:

"You feel that... the patient needs to wake up and get off the ventilator but at the same time you feel...sometimes the patient is unsafe when they are writhing around the bed and pulling at tubes...it is quite conflicting you want yourself and the patient to be safe, yet you want them to progress in getting out of intensive care" (Interviewee 003)

The ICU nurses come face to face with moral dilemmas each day. Some days ICU technology demands their almost undivided attention for the benefit the patient as Galvin (2010) highlights, but these nurses interviewed demonstrate times when, as a result of technological decisions, they are faced with wakeful agitation, visibly distressing and frustrating, but with the evidential knowledge that these increased wakeful periods for patients have proven long term benefits (Girard et al.2008;Kress et al.2000).

7.1.2.5 Intensive care and socio-political knowing: the context of nursing

In order to reflect current healthcare, a fifth pattern of knowing was considered. The socio-political knowing focuses on the organisation that the nurse is working within (White 1995). Patient and nurses' roles are critically influenced by their social, political and economic environments. The effect of organisational restraints is evident in the interviews with the nurses, particularly articulated in poor staffing levels and national targets. The experienced nurses discuss patients from a management stance; they talk about patients sometimes as numbers and the need for beds and getting people discharged from ICU to make way for more admissions. This nurse illustrates this nicely. The patient is the focus, but closely followed by organisational need which cannot be ignored:

"Good for the patient primarily obviously, good for the patient's family, but good for us, good for whatever targets we might have…. patients through the door… big knock on effects, good for A & E if they can get patients up here quicker… if we have got empty beds" (Interviewee 009)

Staffing levels in ICU, as alluded to in the literature review, are high to reflect the complex needs of critically ill patients. Despite the SPSP not specifically driving for a more 'wakeful' ICU population, it has been demonstrated as a felt consequence of integrating consideration of a daily sedation hold into everyday practice as part of the VAP bundle. This is supported by the nurses' narratives, who perceived the potential consequences of a sedation hold as requiring greater nursing input to ensure optimally safe care, but with no additional nursing resource forthcoming to meet the increased patient need identified as a result of wakefulness.

This nurse, caring for an acutely ill and wakeful patient reflects upon the changes in staffing levels and their implications for her patient's sedation:

> *"Six years ago that would never happen. I would never be doing a break with a cubicle, ever. Cubicles always got covered themselves....* [it's] *quite difficult, because then I'm thinking when I'm on my break do I increase my patient's sedation to make him safe..."*
> (Interviewee 012)

The nurses can develop their empirical, aesthetic, moral and personal knowledge but still have to work within the current financial constraints and outcome- focussed health service.

7.1.3 Summary of chapter

It appears that the ICU nurse initially focuses upon gaining and developing professional knowledge, concerned with physiology and technology. As they become immersed in the intensive care world they slowly develop their own intensive care 'world'; a direct result of their knowledge, experience and 'experiences'. The patterns of knowledge the nurses utilise in their ICU nursing is important and has notable impacts on their practice and how they react to certain practices. Their need for empirical knowledge is seen as fundamental to their nursing; it is what makes them feel safe and able to cope with acutely ill people admitted to an ICU; the rational for pursuing an ICU career. However, once mastered and requiring only on-going development and refinement they sense the confidence to 're-focus' on the art of nursing and caring. Facilitated by their empirical knowledge, personal knowledge develops with experience and the learning from experiences. They talk about caring for patients and families, fostering wellness and assisting people to get better and leave ICU. They support people

through their period of illness, using a combination of their empirical technical, scientific knowledge coupled with empathy ethics and morality (Carper 1978), all delivered within an ever demanding organisation, target and economically driven. The patterns of knowing and the nurses' interpretation of their intensive care world, underpin the behind the thoughts and feelings elicited through the interviews in terms of their approach to technology in ICU, the changes in sedation practice and their clinical decisions.

7.2 Technology and the Intensive Care Unit

7.2.1 Overview of chapter

This chapter will examine the concept of ICU technology and the nurses' feelings surrounding ICU technology. Much of what has been elicited from the nurses about technology is not new; it merely supports that already in the currently available literature. This chapter helps to set the context for Chapter 7.4, where the nurses' feelings and opinions surrounding a new sedation (responsiveness) technology are explored. The researcher felt it necessary to explore the nurses' views of ICU technology and the implications it had for their 'world' before exploring their feelings about a new technology. It will set the scene of the ICU nurses' technological 'world' and provide understanding and insight of technology that will be useful to set the new responsiveness monitors implications against. The literature review clearly highlighted that ICU technology and nursing have been at logger heads for many years. Intensive care units (ICUs) are very much defined by the technologies that dominate them, but inarguably how these technologies are *used* in practice is just as important (Barnard 2002). How the nurses use technology in their daily practice and the feelings they hold about these technologies is unveiled. Although the interviews did not unearth any new themes it does demonstrate that this is still an area of unease.

7.2.2 The purpose of ICU Technology

The features of ICU technology identified by the researcher in the literature review as significant for this study were as an alert - to draw attention to or assist in avoiding adverse events, and as a decision making aid - to guide therapies and decision making, potentially changing patient outcomes.

7.2.2.1 Technology as an Alert

Some of the nurses described feeling ICU technologies gave them important information more quickly; making them aware of changes to a patient's clinical condition. An increase in patient safety is described as a consequence of modern technology (McConnell 1990), yet in contrast Heidegger (1977) very much viewed technology as a danger to our 'Being'. The alerts mostly referred to were alarms; ICU's are riddled with them (Blum & Tremper 2010;Sanderson 2009).

Alarms

Alarms are by far the most obvious alert technology offers and hence it was a common issue elicited across the nurses' interviews. Alarms in ICU are plentiful and attention seeking, they are visually colourful and eye catching, audibly loud and distracting or a combination of both. This nurse considered whether he thought ICU technologies required so many alarms. He explains why in *his* 'world' he'd rather have alarms; albeit many of them:

"I'd rather have an alarm on something than not have an alarm on something, particularly if it's something that has the potential to go wrong and if it does go wrong, or if you're not achieving parameters set then you're made aware of that...particularly in the situation were staffing is low, were you may be watching two, three or four patients at a time…" (Interviewee 009)

Similarly this nurse says:

"I think they are necessary I mean because they ensure safe practice...I think they are necessary, every alarm has its function" (Interviewee 016)

In these cases the alarms are viewed as a positive addition to the nurse's work, improving care and safety, particularly, in the current climate of staff shortages and increased patient workload. They alert; reducing the opportunity for clinical changes in a patient to be missed.

However, many alarms are proven to be false alarms and could actually be increasing a nurse's workload (Görges, Markewitz, & Westenskow 2009). The concept of 'false alarms', examined in the literature review, revealed that much of a nurses time is spend silencing alarms that have no consequence for the patients at all. This nurse's comment supports this finding; he was talking about a feeding pump he'd had experience with:

"They were always alarming, for unknown reasons and wasting lines and a lot of time fixing them." (Interviewee 003)

Interestingly, although alarms are a welcomed alert, increasing patient safety, they also emerged as a source of fear for some of the nurses. This nurse recalls that it was the alarms that scared her most about the technologies, specifically the consequences of not attending to an alarm appropriately when she first started working in ICU:

"If there were alarms going off and you didn't know how to sort them out, or you were afraid to turn them off and not have corrected what was wrong, that was the biggest fear for me" (Interviewee 016)

This nurse is reflecting on her practice, indicating that it was when she first started working in ICU that she felt this way about the alarms, indicating perhaps it was her inexperience that was the cause of the fear. Remarkably, although the nurse was 'scared' of the alarms, she was more afraid of missing something that would affect her patient. The literature around inexperienced nurses' interactions with technology suggests that sometimes the patient focus is completely lost (Wilkinson 1992).

It appears that at first, when a nurse is new to the alarms or the alarm is new perhaps, the nurses are in a state of 'hyper alert' but this 'alertness' dampens down as they become more used to hearing them:

"You're maybe not quite as 'alarmed' by alarms if you know what I mean...You hear an alarm when you first start for example, you think 'oh my god what's that?', 'what's happened?', but now you think, (laughs)....I suppose it's looking at the whole picture rather than just the one thing" (Interviewee 005)

This concurs with Sanderson (2009) whom reported that nurses were able to correctly identify alarms without any visual aid but their length of experience influenced their ability to identify them correctly. However, human beings only have the capacity to reliably identify five or six alarms (Sanderson 2009), and after prolonged false positive alarms occurring that they are likely to be dismissed or not arouse the user in the manner they are intended to (Meredith & Edworthy 1995). This is noteworthy considering workload and staffing issues in current healthcare settings; the nurses will essentially be contending with even more patient alarms. Agreement with this was elicited from this nurse; as you become more 'familiar' with alarms they provoke less response, *unless* they are unusual:

"It's 'guess the alarm', you know in the middle of the night...something unusual goes off and everyone is like...' Oooh what's that one, I don't recognise that one?'...There are a lot of alarms but you just get used to them I think." (Interviewee 004)

It is a potentially serious problem with false alarms if alarms start to lose their 'alarming-ness'.

Alarm Prioritisation

Prioritisation of alarms was highlighted by some of the nurses during the interviews. They described what they felt were 'priority' alarms and how they identified these 'priority' alarms. With so many alarms to contend with, and considering the limited capacity to reliably identify them all, why nurses prioritise and sometimes silence alarms can be understood. The silencing, permanent turning off, of Central Venous Pressure (CVP) monitoring[13] alarms specifically emerged from some of the nurses' interviews as a 'normal' practice'. This nurse suggests that heart rate and blood pressure are physiological priorities; she is explaining a possible rationale for why some nurses silence their CVP monitoring alarms:

"...I mean 'CVP' isn't as important as saturation or heart rate or blood pressure so maybe they just put it lower down the list of priorities as an alarm…" (Interviewee 016)

On the other hand, this nurse's experience working in a cardiothoracic ICU influences the reason why he *does not* silence his CVP alarm:

"I think it's probably that in my old unit, many patients' [cardiac] *tamponaded[14] and if you're CVP went up quite quickly...it gave you an indication..."* (Interviewee 015)

His past experience from working in a different specialty has taught him that an increase in a patient's CVP is a key marker for an event that has life threatening consequences. This nurse suggests if there is an alarm available on technologies in your 'care' you should, in normal circumstances use it:

"I try not to silence an alarm, because you know, if it's set up, I try and have it on." (Interviewee 016)

However, alarms *are* silenced and there may be a number of reasons why. It could be the nurse's experience enables her to correctly identify which parameters she needs to be alerted to changes in. It may be an indication that there is a knowledge deficit. It could also be that the alarm has been repeatedly falsely alarming and the

[13] Central Venous Pressure (CVP) monitoring reflects the amount of blood returning to the heart and the ability of the heart to pump the blood into the arterial system. The pressure reported by this continuous monitoring can be used to guide therapies, for example if the patient requires more or less intravenous fluids.

[14] Cardiac Tamponade: The compression of the heart that occurs when blood or fluid builds up in the pericardial space.

nurse has turned it off so it will stop making an unnecessary noise. Incidentally, there are special circumstances; if a patient is dying or palliative care is on-going when usually all alarms are silenced.

Interestingly, the nurses made no reference as to who determined which alarms could and should be silenced perhaps automatically taking on these decisions. As the literature review revealed, there is little guidance surrounding when and if alarms should be silenced, only recommendations not to silence pulse oximetry and $C0_2$ monitoring (see p23). The setting of alarm parameters was alluded to in response to the responsiveness monitor as something the medical staff *could* direct. This is described in Chapter 7.5 and the implications of this approach discussed in Chapter 8.

Ultimately, modern alarms are in place to alert that a parameter is changing; to prevent and/or avoid an adverse event occurring; they are to promote patient safety. For instance, a patient's blood pressure or heart rate falls out with the pre-set limits dictated by the nurse, an alarm will alert the nurse of the change and then she will make a decision as to whether this change merits any intervention/action. Without the alert, the nurse may not pick up on their patient's change or there may be a delay; such a delay in critically ill patients could have detrimental consequences or lead to adverse events occurring. However, the alerts will only be effective if the technology is being utilised correctly in the first instance. This is where Heidegger's (1977) fears of technology can be understood. We favour technology, but ultimately endeavour to manipulate it in such as way that we control it, we are its master, this potentially changes the essence of the technology and even what it was intended to do. However, considering the organisational and staffing pressures healthcare currently faces, it is easy to identify the benefits of alarms. Healthcare technology is no longer as novel as it was in the 1950's, the era of Heidegger's writings.

Against the increasing complexity of healthcare in the 21st century, has emerged a clearly defined culture of patient safety. The occurrence of adverse events, wish to be avoided and alarms assist in this. Adverse events are explored further in the next chapter in relation to sedation practices; they stir a number of emotions within nurses. Furthermore, Chapter 7.4 will also revisit the issue of alarms in regards to

the new sedation monitor. The sedation monitor did not have an alarm; this received a mixed response from the nursing staff interviewed.

7.2.2.2 Technology as a decision making aid

Another face of technology was it use as a decision making aid; it can help to guide therapies which in turn, could affect patient outcomes. It was already established in the literature review though that the guidance offered will only be useful if the information provided can be interpreted by the user (Cruz & Franklin 2001). An example of technologies being inadequately used or being misinterpreted that arose during my interviews was the use of Central Venous Pressure (CVP) monitoring again:

> *"CVP for example; the transducer has to be linked to the monitor and has to be at the right height and I have witnessed nurses writing on charts CVP readings that were not accurate because the transducer wasn't at the level of their right atrium. I have seen that multiple times and then people could therefore be given lots of fluids or not given fluids when they should or shouldn't be."* (Interviewee 001)

The nurse above had less than one year's experience working in ICU, his interpretation of his observations surrounding the (mis)use of CVP recordings, are likely a consequence of his inexperience. Inexperienced nurses are known to be more protocol and precision driven wherein a more experienced nurse will know where the deviations from such protocols are justifiable and sometimes even necessary (Benner 1984a). The nurse's observation also resonates with the issue of competence explored in the literature review (see p24). However, the exact context in which he made his observations and the nurses involved are unknown and therefore the conclusions drawn here are based upon unfounded information, but require consideration. Furthermore, the philosophical view is that 'beings' will interpret the essence of technologies differently, in a bid to be its master (Heidegger 1977). The nurse's observations are too supported by the historic misuse of another invasive technology, the Pulmonary Artery Catheter (PAC) in ICU; unfortunately the consequences were fatal for some patients (Sandham et al. 2003).

7.2.3 ICU Nursing and technology

It can be argued that anyone who actively pursues a career in ICU (having physically been in one or not) will undoubtedly have images of technology and in some way or

another must have been drawn to the environment by its technical imagery. Each of the nurses' interviews began by exploring how long each nurse had worked in ICU, where they had worked prior to ICU and what had drawn them to a career in ICU. The following excerpts reveal that technology was certainly part of the attraction to ICU for some of the nurses:

"..just a bit more hi-tech" (Interviewee 008)

"*...working in a highly motivated technical area"* (Interviewee 012)

This nurse said although the technology was not what specifically drew him to work in intensive care; he did like 'technical' things, referring to it as "*boys and their toys*":

"Technology. It's not one of those things that swayed me into coming into ICU but it certainly didn't daunt me and I quite like playing with computers and bits and pieces of technology" (Interviewee 013)

The matter of ICU, gender and technology was introduced in the literature review. To recap, it was suggested that nursing is, or was, traditionally viewed as a female vocation and technology a male domain. This has led to the perception and proven reality that ICUs attract more male nurses due to its technological nature (Dassen, Nijhuis, & Philipsen 1990). Interestingly, as the researcher has already reflected, although an equal number of male and females were interviewed for this research; sub-consciously she had assumed that more females would be interviewed (see p124).

On a similar thread to gender, this nurse highlight age as a potentially influential factor in regards to acceptance of technology. He felt that perhaps younger nurses were more comfortable with technology:

"...I find that the younger nurses who are coming through tend to like modern technology" (Interviewee 001)

This was an isolated view described by this nurse, but does link with the design issues highlighted in the literature review. An ageing workforce needs considered in the design of technology, particularly as technological advancements are overwhelming an ICU nurse's workplace (Sipe et al. 2003).

7.2.3.1 Embedding compassion in technology

Many nurses also mentioned the appeal of one to one care and the opportunity to develop clinical skills as the main attraction of ICU nursing above technology itself; also resonating with the literature available (McConnell 1990). There is an overarching theme that being able to provide individualised care or care of a better standard is the purpose or desire of nursing staff in ICU, suggesting that compassion can be embedded in technical care. The importance of being able to deliver one to one, individually tailored care was highlighted in the previous chapter and is supported by Carper's (1978) patterns of knowing in nursing. In regards to embedding technology within compassionate care, these nurses describe ICU technology being integrated into the care, supporting the management and decision making rather than something that stood alone; with its own agenda:

"It's part of that whole thing of looking after 'one' patient, monitoring most of their systems... and the technology you use to do that...helps you do your job. You get to see things at a glance rather than having to go and derive a result. So I like the technology because it enables you to see what's going on with the patient at a glance..." (Interviewee 010)

"It just makes it more patient specific ...it will shorten their time I suppose. It's quite hard to think that it speeds it up, speeds up their wellness, [pause]... but it definitely makes things easier for nurses' and doctors' but also for the patient as well because you want them to have as little time in ICU as possible." (Interviewee 012)

This nurse gives a specific example of a piece of ICU 'technology' to illustrate ICU technology and compassion working together:

"Arterial blood tracing for a continuous blood pressure ...that is absolutely brilliant... It is better for patient comfort not having to have the cuff to measure all the time and just helps the nurses who can just glance at something and see someone's blood pressure instantly." *(*Interviewee 001)

Interestingly, the nurse appears to prioritise equally the outcome of 'comfort' as well as accuracy and precision of the measurements delivered by such technologies. The ICU environment offers the opportunity to get to know patients better, provide one to one care but also an increased contact with a plethora of technologies; also requiring *care* (Steiner 1992). The literature review demonstrated the concern that technology might dehumanise care (Barnard & Sandelowski 2001). Heidegger (1954) felt strongly that modern technology presented a danger to its users and recipients distracting them from the patient and enslaving its users, that is that it distracts from

holistic patient care and assumes the patient to be an 'object'. Yet, Kiekkas and colleague's (2006) study reported that the nurses felt technologies increased the effectiveness of the care they provided for patients and assisted them in completing their nursing care more effectively. A decade forward the nurses interviewed continue to report the same feelings about ICU technologies that are already evident in the research evidence. The researcher questions why in over two decades we have not been able to resolve this rift? This is despite many ICU patients being unconscious and perhaps 'object-like' in appearance.

7.2.4 Nurses views of technology

The ICU nurses describe that they very much see technology embedded in their daily practice, *assisting* them with the care they provide to patients. This resonates with Sipe and colleagues (2003) proposal in the literature review that "Technology should support patient therapies, reduce stress, and promote a holistic approach to healing, as well as entertain" (pS36). To recap it was established in the literature review, entertain meant the technology should engage the nurses, be interesting, user friendly (something they can get to grips with easily) and support their nursing practice, not something they feel frustrated by (Sipe et al 2003).

7.2.4.1 The Entertainment

The researcher elicited from the nurses how they felt technology supported holistic care and entertained. As expected the nurses had positive things to say about the technologies they worked with:

"I think it's amazing what they [technologies] *can do..."* (Interviewee 006)

The above nurse said she was continually amazed by the advancements and the seemingly endless boundaries of ICU technology. The following inexperienced nurse, through discussions with other nurses, has grasped an understanding of the technological advancements and the impact this has had for current nursing practices:

"I think it is very useful because it gives people readings and scores...that they didn't have in the past...The changes in the machines that have come in since then [ten years ago]*...it seems like quite a lot but I don't know how I would cope without it...I think it is a very positive thing as long as it is evidence based"* (Interviewee 001)

The nurse refers to the use of evidence base practice as the bench mark for technological advancements, these opinions may be in part be driven by the fact that as an inexperienced nurse his practice will be very structured and protocolised (Benner 1984). It could be argued that his intuitive skills, to assist his delivery of nursing care, have not developed yet due to his lack of clinical experience (Benner 1984) and hence why he wonders how he *"would cope"* without technology.

Saving Lives

Some of the other, more experienced, nurses reflected on how technology has advanced and that these advancements save patients' lives, unsurprisingly, this was viewed in a positive light:

> *"I look at basically how we save peoples' lives .... 10-20 years ago, people wouldn't even have been thinking about how we treat people with things like the 'Cooling' protocol*[15] *coming in for out-of-hospital arrests. A lot of them ...they would just have been left. I think there are a lot of people who do survive critical care that probably wouldn't have 10-15 years ago."* (Interviewee 006)

> *"I think it is excellent that we can help people and families and patients...continue to live and continue to enjoy each other... I am glad that we can do everything to the extent that we can to help people recover from when they are unwell"* (Interviewee 004)

Nurses become nurses to care; to provide care to others, and this is a fundamental concept of 'being-in-the-world' (Heidegger 1962). Unlike some other nursing specialities, ICU nurses do not have the ability to offer preventative healthcare; to prevent a critical illness occurring. Individuals are admitted to ICU as they are suffering a health crisis; a life threatening health crisis predominantly. Intensive care nurses' have chosen to work in a technologically intense environment in which they can give high quality, high nursing input care all the while using technology to assist them in their aim to restore health to the patients, and essentially help them to survive. The ICU nurses still perceive their role to deliver caring and compassionate nursing care; they believe their role is strengthened with technology's involvement.

[15] Cooling Protocol: Current best evidence suggests that the use of mild therapeutic hypothermia (30°C to 34°C) in unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest when the initial rhythm was ventricular fibrillation can improve morbidity and neurological outcome for patients. Sometimes this is referred to as the 'cooling protocol'.

With technological advancements they can do more, and they can use it to save lives; lives that only a couple of decades ago may have been lost.

Faster care

As already alluded to earlier, the nurses perceive technology to give them information quicker; benefiting them and their patients. This nurse welcomes technology giving him information more quickly and states that he *needs* technology for this reason:

"The products [technologies] *are actually very good...and they keep improving it...It has a bearing on your decisions... As much as you would be looking at the patient while doing your basic observations, you also need that technology to let you know things quicker, much quicker than these problems that manifests ...from the observation sometime..."*
(Interviewee 002)

This nurse offers an example of how a common piece of ICU technology gives her information automatically without her having to perform another test first; offering advantages to her and the patient:

"Well with the CO_2 monitor[16] *you're not having to do gases all the time so you have got a constant view of the patient...what their parameters are doing...it allows you... to make tweaks to the ventilation not having to run off and do a gas* [blood gas analysis]*...You can watch* [continuously] *what is happening."* (Interviewee 007)

Although many technological advances are viewed as an advantage, this nurse suggests that technology itself does not necessarily make her job easier, just more efficient perhaps:

"I think it does not make your job easier but it highlights things a lot quicker"
(Interviewee 007)

It is strongly emerging that the nurses view technology as a partnership, something they can collaborate with to achieve the best for their patient. It is an alert to sub optimal changes in their patient's conditions; a welcome alert especially in the

[16] $C0_2$ monitor: A person's breathing rate influences the level of $C0_2$ in their blood, breathing too slowly will lead to too much $C0_2$ and breathing too quickly (hyperventilating) will lead to too little $C0_2$ being present. Both can have negative effects on a person's body. Monitoring of $C0_2$ levels can be done non-invasively by simply attaching a device to the ventilator tubing already connected to a ventilated patient. It will display a continuous $C0_2$ reading on the ICU bedside monitor screen for all to see. It means that arterial blood gases (an invasive procedure) are not required to be taken as frequently from the patient.

current staffing climate. It assists them in managing their patient; technology is in the foreground of the care they are providing, it is an essential part of their mission to care.

7.2.4.2 The Dependency

Technology is not received by all in a positive manner (Barnard & Sandelowski 2001; Heidegger 1977;Polkinghorne 2004). There is still a fear echoed throughout nursing literature that technology will demand too much attention from the nurse. Technological equipment easily outnumbers patients and staff in an ICU; each piece has a unique function, delivering a unique reading or number to be interpreted. Technology, is by far louder, often more colourful and therefore more attention 'grabbing' then the patient 'hooked' up to it, and often requires *care* itself. It is simple to see how people can become over dependent and reliant on ICU technology, resonating with the thoughts elicited from this nurse:

> *"...I suppose...you do become reliant on them...It's just being careful that what you are seeing on the monitor does equal what is actually happening. For example, whether that SATs[17] trace is accurate or whether,* [points to monitor at bed space] *so it's that kind of thing. It's not relying on them too much. I guess that's what I am trying to say. I like them because they help us but you have always got to be aware of human error or just the machines that sometimes they are inaccurate"* (Interviewee 008)

An over reliance on technology, expecting it to tell you everything you need to know about a patient and thus failing to look at the signs the patient may (or may not) be exhibiting, is not technology's role, it should be used in addition to nurses other skills:

> *"...it's probably good...that you don't depend fully on it, but it helps in combination with other observations to make a decision about what you are going to do... Most of the time it actually confirms your observations...but...it can be unhelpful as well"* (Interviewee 002)

This nurse believed that having general ward based experience before working in ICU was an advantage; it gave her skills that technology cannot teach and prevents her from becoming over reliant on the technology available to her in ICU:

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[17] SATS: A colloquial reference to a patient's oxygen 'saturation' level; the percentage of haemoglobin binding sites in the bloodstream occupied by oxygen. Normal ranges, for a healthy person, are usually quoted between 96-99%

"I think that when you work on a ward, [general ward] *there are certain things that you are never going to get apart from in* ***ward*** *situations, like your time management and understanding the basics of patient care and...just looking at your patient, not relying on lots of equipment and you get that gut instinct that you know something is not right and you might not be able to put your finger on it...I think if you've got ward experience, you do have a bit more insight into* ***looking*** *at your patient a bit more."* (Interviewee 006)

Although the researcher was unable to find any evidence to support this nurse's claim, it does not seem improbable. The nurse above talks about a 'gut instinct' an intuition, which ultimately develops with clinical experience. Intuitive reasoning is often viewed as the antithesis to what evidence based medicine prides itself on (Benner & Tanner 1987a); scientific and logical reasoning. However, intuitive decisions play a fundamental part in many nursing clinical decision making models (Benner, Tanner, & Chesla 1992;Croskerry 2009;Hamm 1988;Standing 2008). In contrast, a less experienced nurse below describes how easy it is to be distracted by technology:

"When you first start here...you would be taught to be looking at the monitors; you would be looking at other observations, but...sometimes if you are not careful you would be caught by the alarms showing asystole[18] *and actually that would kind of divert you from really observing the patient, to see if the patient is really so… and not just what's being read..."* (Interviewee 002)

The above nurse indicates that the ICU education process teaches them to watch and pay attention to the technology.

Back to basics – the essential skills of care

The importance of acquiring and maintaining 'traditional' or 'basic' nursing skills, emerged from some of the nurses interviews in regards to effective use of ICU technology. They appreciate the technology brings advantages to their work and to their patients but still recognise that the basic skills should always be retained, this way dependency can be avoided. This nurse illustrates how she feels it is a 'negative' in terms of technology if people don't know what to do if you don't have the technology:

"You have to be able to understand how to use it [ICU technology]. *A lot of the monitors are now quite complex and I think technology is only useful if the person who is using it knows how to use it, as otherwise it can hinder care. Sometimes people say it deskills people*

[18] Asystole: a state of no cardiac electrical activity, hence no contractions of the myocardium and no cardiac output or blood flow

so I think it is still important to learn how to do things the traditional way if that is applicable" (Interviewee 001)

"...for example if somebody knows how to take a blood pressure by pressing a button ...but doesn't know how to take a blood pressure with a cuff and a stethoscope... and even oxygen saturations you know; if the SATs probe says 60...and they [the patient] *are not blue and they are ventilating well...then you would start to query is that correct? So, it's people knowing what to do and whether to question the machinery."* (Interviewee 008)

This latter nurse is emphasising the need to still use clinical judgement and knowledge in addition to the technology. Arguably though, this is much more difficult for inexperienced nurses to do, whom do not have the same 'experiences' and knowledge to draw upon. The essential skills of care are developed through formal education and practice based/experiential learning. However, the technology presented to nurses in ICU is often alien and novel. The expectation to grasp an understanding of these and their workings is high; patients are dependent upon them. As a result, it is simple to see how a dependency breeds, especially for less experienced nursing staff. The nurses also highlight that they recognise a lack of essential skills will affect the care they deliver to patients, this is supported by the literature, where it was noted that a lack of education has implications for patient safety (Bolton 2006). Furthermore, ICU should be less driven and controlled by technology and its 'data' especially following the PAC scenario wherein purely technology driven decision making could be potentially harmful.

Malfunctions

A dependency on ICU technology becomes a much bigger cause for concern if a piece of technological equipment malfunctions and either the nurse does not realise it has malfunctioned or what to do without the piece of technology, even if only temporarily. One nurse suggests for these reasons you should not become over reliant on ICU technology and maintain a certain level of wariness when using it and interpreting it:

"...I think it's just important to be wary of the fact that the equipment is not always right and you need to make sure that it is attached to the patient, that it is plugged in and that it is working properly before you act on the numbers it provides you." (Interviewee 013)

The irritations of malfunctioning equipment are expressed by this nurse; it extends her role beyond nursing:

"If they malfunction, that can be really frustrating if you are trying to care for a patient but it's better that they have it. Sometimes you feel as a nurse you have to be a technician, as well as a nurse, as well as a psychologist... yes it is frustrating if things malfunction, but again that's how it is in life..." (Interviewee 004)

Being able to trouble shoot and identify when bits of technology are not working or delivering the correct information is as important as being able to fix them:

"It is useful; yes absolutely it's useful...when it is working correctly... I think what is important is knowing how to use the equipment...for example, you may think you have a bad trace on your monitor but actually it is because your scale is completely wrong because the patient before [in the same bed space] *had a completely different scale so your blood pressure looks really flat but actually it's quite dynamic; it was the scale that was wrong. So I just think it is important that if people are using technology that they know how to use it properly.... as well"* (Interviewee 008)

Lessons are learnt from malfunctions. Malfunctions can be of human or machine origin. This nurse highlights, that he appreciates malfunctions can be user related, linking back to earlier wherein the technology is only as good as the user:

"If I fail to work it, (laughs), one or the other"

(Interviewee 013)

The same nurse had had a personal experience of equipment failure while he had been out of the ICU with a patient having a CT scan[19]. He explained that the monitor that displays all the vital signs failed. When asked how it made him feel he said:

"It was a bit uneasy...[it] wasn't a piece of therapeutic equipment, it was a piece of monitoring equipment so there was nothing that I wasn't doing to the patient that was going to cause them harm; it was just the information that I wasn't getting, that I couldn't act on, it was a bit more convoluted." (Interviewee 013)

Interestingly, it emerged that the nurse was able, in retrospect, to rationalise the situation. The patient was not going to come to any immediate harm as a result of the technology failure, re emphasising that patient safety is a priority but also that his nursing experience enabled him to manage the scenario effectively and efficiently.

[19] A CT (computerised tomography) scan: Allow doctors to inspect the inside of the body without having to operate or perform unpleasant examinations. CT scans have to be performed in a specialised department in a hospital, patients must go to the department; the CT scanner cannot be brought to them.

He continued by explaining why he felt he was 'okay' without the monitoring for 5-10 minutes:

> *"I didn't even have manual equipment. I could take a pulse but I couldn't take a blood pressure...but all the time that I was doing that* [assessing vital signs] *I wasn't getting the monitor fixed, which would be a much easier way of doing things... It was swings and roundabouts...I wasn't on my own... I think I was with two doctors, two radiographers and a radiologist, so it wasn't the end of the world but it's not a situation you want to be in."* (Interviewee 013)

The basic nursing skills he had retained proved essential for this nurse's failed equipment, yet he was still faced with the dilemma of using these basic skills or fixing the equipment. However, if the patient had come to any harm during the described scenario, might he have been subjected to criticism, even blame. There are some standards that state that certain types of monitoring are a minimum necessity during intra and inter hospital transfers (Intensive Care Society 2011). This nurse explains how a monitor malfunctioning as a patient returned to ICU from the operating theatre made her feel:

> *"I think it puts it puts you off step ...in bad light...You are all ready, you have got everything prepared, then it makes you feel like you are not prepared; you know, you are feeling like you're off and that you're not getting things right, when actually it's just the machine...but like for everyone else around it probably looks as though like, maybe it doesn't [laughs]...anyway it makes you feel like you're incompetent because you haven't been able to get the thing to work ...[laughs]..."* (Interviewee 004)

Therefore, in addition to the frustrations of malfunctioning equipment the nurse believes that her peers will view the malfunction as a direct reflection of her and her capabilities and competence as a nurse. This is an interesting notion, considering often technology malfunctions occur apart from human fault (Fairbanks & Caplan 2004).

Learning from malfunctions

The nurses stress that they try and build on malfunction experiences, not dwelling on the negatives but learning from them and then passing these 'lessons learnt' on to less experienced colleagues to prevent them happening again. For example, interviewee 013 always makes sure he has the cables for his monitor on transfers out of ICU now, no matter if a short inter-hospital transfer, and interviewee 004 always turns her ICU monitor on and checks it is working before her patients are admitted to

ICU. Nevertheless, interviewee 013 did hint that, in view of his experience though, he no longer trusts the technology the same now, and explained how he prioritises his patient's safety:

"The batteries in the monitors are not great... I don't ever trust them, particularly because my work is prioritised alphabetically so ABC...I need to take a spare airway, because that's the top of my list of priorities and if my ventilator stops working then I'm in a really difficult situation..." (Interviewee 013)

The malfunctions generate fear and loss of control; it brings home the real dependency of their patients; particularly if it's a piece of therapeutic equipment that fails.

7.2.5 ICU Technology, Function of Time, Exposure and Experience

A theme emerging through the interviews has been the influence of nursing experience on the nurses' 'experiences' of technology. Nursing experience is a fundamental part of decision making and thereafter the care provided to patients (Benner, Tanner, & Chesla 1992;Watson 1991), including 'technologic' care; this is clearly reflected in the literature review too. In ICU it is recognised that inexperienced nurses interact and manage technology different to their experienced colleagues. This nurse recalls how she felt about all the technology when she was new to ICU, compared to how she feels today:

"When I first started I found all the technology a bit overwhelming from going to using a couple of pumps to monitors such as ventilators, filters, ICP bolts, but now feel comfortable with them: you wouldn't do without them. They are there to help you not to hinder you" (Interviewee 012)

In this extract a nurse describes *why* technology was so daunting initially and how learning how a piece of technology functions in its entirety allows you to overcome these feelings:

"I think straightaway I was quite happy using them... I'm quite a technical person; I like doing things, machines and understanding things. I suppose when I first started I was a bit...put off with all the cables and not knowing where the cable went and you thought when you touched something, something went wrong, so you were probably a wee bit cautious about using things or pressing buttons when you didn't really know what was happening ...But now I'm very happy with it and I feel most of the machines are straightforward to use. There's not really that much you can do wrong initially...you know even if you press a button it's not all going to go downhill straightaway..." (Interviewee 014)

This resonates with Cooper's (1993) assertion that nurses in ICU felt "competent technological management constituted a major form of care" (p26). This again supports the notion that ICU nurses embed the technology in their care described earlier. In contrast this nurse suggests even with experience, technology can still be utilised ineffectively, he feels complacency is more likely amongst experienced nurses:

"I suppose as you get used to it;, you get used to the machines;, you get a bit more complacent I suppose about the alarms and 'what have you' and you know what the machines do better and what they are capable of, and know what can go wrong if they don't do what you want them to do.. basically" (Interviewee 009)

The above nurse's excerpt links back to the discussion earlier surrounding technological alarms; over time alarms become less alarming staff experience 'alarm fatigue' (Görges et al. 2009). It would seem that nursing experience could potentially encourage technological disengagement; in the sense that the nurses become *over* familiar with the technology. Experienced nurses have 'experienced' plenty of technological malfunctions and patient emergency scenarios, and yet their comfortableness with the environment could be argued to be treading a fine line between this and complacency. The same nurse continues by describing how with experience you develop 'auto pilot' like skills when using common pieces of technology:

"For example a ventilator. When you first start, you will get to know the ventilator, get to know what it does, get to know what each mode does and then as you get more experienced it becomes like an 'auto-pilot' for you where you just know to press certain buttons and it's going to do certain things. It is interesting because you can see new staff coming in now who are the same as you were when you start - you know, 'rabbit in the headlights' and you know, you just get used to it..." (Interviewee 009)

This nurses descriptions mirror the progression from novice to expert literature (Benner, Tanner, & Chesla 1992). The auto pilot responses referred to would be expected of an inexperienced nurse as himself. This nurse reflects that the technology learning curve is never ending. She suggests that you start out just wanting to be 'technically safe', it is the priority for inexperienced nurses, this then progresses to learning how to maximise the technologies' potential to benefit the patient:

"I think I felt very quickly that I knew how to keep a patient safe...but it is how to use the machinery to the absolute best is obviously something that you are working towards. You know you don't just want to be 'OK', you want to be able to use the machine to its optimum

potential, for the benefit of the patient...I still, even after five years...want to do better." (Interviewee 004)

Patient safety emerges as a significant theme through the nurses' interviews it is at the forefront of their minds. It plays a significant role in their decisions surrounding sedation practices which is explored in the next chapter.

As anticipated there were a mixture of both positive and negative comments regarding the role and use of ICU technologies, this is reinforced in the abundance of nursing literature surrounding technology. They described the benefits of education to ease the fears of new ICU technology. Often nurses resorted to 'learning on the job', not ideal but perhaps realistic in current 'stretched' healthcare environments. There are real practicality issues trying to train a large rota of nurses on a new piece of equipment and the problems of gaps between training and use which occurs:

"Sometimes the gap between the teaching and the arrival [of technology] *is a bit of a hindrance. So you need to learn how to use the equipment and then go and use it rather than forget about it."* (Interviewee 013)

The same nurse reflects on recent training he received:

"We've just got a new em rapid infuser [20]but I learned about it a month ago, I haven't seen it in action yet....I will have forgotten most of what I was told about how to use it at the outset as we've got the old one; I know how to work that... I'm a bit reassured by the fact that the instructions are physically attached to the [new] *piece of equipment ...and that some of my colleagues will have used it before, but with it being new it might come to the stage where it is 4 o'clock in a morning and a patient really needs it and nobody's used it before...that's a bit worrying..."* (Interviewee 013)

Although it is a potentially real scenario, the nurse seems surprisingly accepting of the lack of knowledge he may have, even though he appreciates it may be a *"bit worrying"*. Another nurse refers to the same rapid infuser mentioned by the nurse previously. He said he had been shown how to use it once and had to set it up, and adopts the same pragmatic approach to the lack of knowledge he had:

"With the rapid infuser the other day, it was a new one and we got shown how to use it once and the patient needed it so I rigged it up. The patient didn't actually need it then, I didn't use it but I was a bit worried about attaching it to the patient and maybe not having it right, you know.... I think it would have been fine, it looked alright, I was going to do it anyway…" (Interviewee 015)

[20] Rapid Infuser is used if the patient requires a high flow rate of intravenous fluids. It is an electrical device that infuses fluid rapidly whilst also heating the fluid being infused.

The nurses are keen to learn, be trained in new technologies and procedures, and although not ideal, they will settle for 'learning on the job' or being taught by others who have been trained if the need arises. Is this acceptable in practice, especially from a patient safety perspective? Unfortunately, this is a 'real' healthcare scenario, especially in the current climate of staffing shortage. Nursing experience and 'experiences' are an integral part of becoming comfortable and familiar with technologies, knowing your own capabilities as a nurse and the technologies capabilities. An important issue has been revealed by the nurses. Not only must they develop the skills to ensure they can 'work' the complex and multiple ICU technologies but also must acquire the knowledge, skills and experience to be able to use and interpret the information they give to ensure optimal patient management and benefit.

7.2.6 Technology and the 'heart' of nursing

There appears to be an on-going 'love-hate' relationship between nursing and technology. The technological nature of ICU will always, it appears, go against the essence of nursing - *caring*. This does not mean that no 'caring' takes place in an intensive care unit or that caring is even different (Galvin 2010), but the argument is that technology requires *care* too. The nurses reflect on technological caring as part of the care process, in actual fact, it is often difficult to separate the two entities; this was explored earlier when the nurses gave examples of how they embedded technology in compassionate care. Supported by Galvin (2010) who asserts that patient caring and technology caring do not need to be and should not be viewed as antithetical as some literature proposes. The following passage nicely expresses the dilemma the nurse feels caring for the patient and caring for the technology:

> *"You know, an ICU nurse, it goes without saying, (laughs). It's terrible to say it, but sometimes you do compare yourself to…a mechanic. You've got an engine who is your patient, that's not working, and you've all this equipment that's going to help you make your patient better..."* (Interviewee 014)

It suggests that the nurse requires the technology to be fully functioning to enable her to fulfil her 'fully functioning' caring nurse role and assist the patients' recovery from their critical illness. This resonates with Heidegger's beliefs that 'being' reveals itself through care, it is care that forms people's 'being-in-the-world' (Heidegger

1962). Galvin (2010) believes that this should be recognised as a *real* challenge for intensive care nurses. She refers to this as the balance between hand, head and heart. This nurse contemplates the advances of technology and the ethical implications it may encounter, the ever advancing ICU technologies mean more people survive ICU but are we for some just prolonging lives:

> *"I guess I am just thinking of all our interventions, which are research based and very carefully thought over. It's not that we are just throwing things on people, as far as I can see, in this Unit... Nothing I am going to be doing is just haphazard...It's all very carefully thought out and we are doing the best for our patient and so I am pleased. I mean...some nurses obviously get concerned when you keep people alive too long on ventilators...I think it is a very difficult decision that we can't really make ourselves about how long to keep someone alive...there are difficult decisions in life...."* (Interviewee 004)

It is apparent that there is a quality of life (QoL) issue within the topic of technology prolonging life. Although the researcher recognises this as an important topic area for ICU patients, it is not the aim of this thesis to examine QoL for patients as a result of technological interventions and was not a theme the researcher probed during the interviews.

7.2.7 The design of technology

It is over thirty years ago since Pope (1974) highlighted that technology was not always fit for practice. Yet, nurses are still rarely consulted in the process of new technology development; this does not assist in the formation of a harmonious relationship, particularly as they are the frontline users. It was elicited from one nurse that they feel many technologies come and go, as if they just go in and out of fashion:

> *Sometimes new bits of equipment come along and disappear and you never hear why they disappeared...Oesophageal dopplers[21], they were fashionable for a wee while, everyone was trained up and then they just went out of fashion I guess..."* (Interviewee 003)

In contrast though he described, essential technologies in ICU, monitors and ventilators as well designed:

[21] Oesophageal doppler measures blood flow speed in the descending thoracic aorta using a flexible ultrasound probe. It allows haemodynamic variables including stroke volume and cardiac output to be calculated allowing clinicians to monitor, optimise and maintain end-organ perfusion.

"Screens are clear...your ventilators are user friendly ...there appears to be lots of buttons but you are only using a set amount of things each shift...and they are user friendly."
(Interviewee 003)

The literature review referred to Keenan and colleague's (1999) steps which they propose should be addressed when assessing a new piece of medical technology. Their steps highlighted that technology should be usable, instil confidence and assessed to determine if it affects decisions and in which way. Involving users in their development would inevitably provide more insight into each of these. An oversight of Keenan and colleagues (1999) is the consideration of workforce age alluded to earlier. The age of retirement is rising, and therefore the age of user groups is undoubtedly going to be something that technology developers need to consider (Sipe et al. 2003).

7.2.8 Chapter Summary

Healthcare technology is destined to advance by which patients' lives are saved and life extended more than ever before. The debate of ethics of such consequences is beyond the scope of this piece of work but one that may ultimately need considered. The ICU nurses describe embedding technology within their nursing care, using it as an adjunct to enhance their patient care. The ambivalent feelings towards technology seen in the research literature have been revealed here again in the nurses' interviews. The nurses seem to *need* and *want* the technology but due to experiences of technical malfunctions and the obvious fallibility of technology there was also certain mistrust. The advances in technology also meant that nurses could be faced with technology for which they may have had only minimal or distant training, or worse still, no training at all. Those who develop technology must benefit from involving the users, such as nurses, in the development process. Such users not only have the insight into what works in practice and the implications the technologies but also such involvement may generate greater trust and a sense of ownership and partnership in what are essentially patient care developments The nurses did in essence describe caring for the technology, but as part of their care of the critically ill patient.

Chapter 7.3: Sedation and the Intensive Care Unit

7.3.1 Overview of chapter

This chapter examines sedation practices in ICU from the perspective of an ICU nurses' 'world'. Sedatives are one of many medications administered in ICU. It has been established that sedatives are often administered differently between hospitals and even prescribing clinicians within ICUs. There is a growing body of research evidence suggesting less sedation, resulting in a more wakeful ICU population, has better outcomes for the patients involved. The literature review provides a concise overview of these practices and a rationale for the changes and developments in sedation management that have been, and are still being, integrated into ICUs worldwide. Effective sedation management is of paramount importance and has been shown to have an effect on ICU patients' wellbeing, morbidity and mortality rates. However, even with an abundance of evidence supporting the management of patients with less sedation, the changes have been slow. The chapter will begin by first examining the ICU nurses' perceptions of the changes to sedation management through their nursing career. It then explores the nurses' understanding of optimal sedation and the rationale for managing patients with less sedation, and specifically the role of 'sedation holds'. Following this the implications of a 'wakeful' ICU for the nurses' practice is unveiled to reveal the current realities for their 'world'. Set against specific features, such as staffing levels and workload, the nurses' feelings towards and perceptions of 'wakefulness' are revealed. Despite this emerging reality, this is an area of nursing practice, for which there is currently, little available literature. The data gathered has inarguably revealed new insights.

7.3.2 Nursing observations of changes to sedation practices

On initial reflection of their world as critical care nurses, change emerged as the major theme when they considered past, present and future care. Specifically, in terms of care priorities in their ventilated patients, they explored the on-going changes in sedation practices and when probed on this, sedation was evident as a potent area of preoccupation.

Many of the nurses, particularly experienced nurses, identified firstly the reduction in the use of paralysing agents. Historically, as highlighted in the literature review,

paralysing agents were commonly administered alongside high doses of sedation. The nurses reflected on how, in the past, patients used to be, as one nurse described, 'flatly sedated' However, it was difficult to accurately describe the time frame of the changes the nurses' reflect upon, they simply referred to it as the 'old days' or 'it used to be'. This nurse, with over fifteen years of ICU nursing experience, albeit in a light hearted manner, said:

"That's when I loved it (laughs)" (Interviewee 008)

Such seemingly welcomed memories were immediately followed with, "*You'd better not put that in your study...",* such that despite the honesty in the initial answer the nurse then appeared worried that her answer looking back to perhaps perceived halcyon days would not be viewed favourably. She continued, describing how a patient receiving a paralysing agent was a different experience:

"...in the old days [the patients] *would have been paralysed ... a sedated and paralysed patient is nice, controlled. You can do all your nursing care; you can have them straight in the bed (laughs)"* (Interviewee 008)

What this nurse reflects upon are patients who, receiving paralysing agent and sedation, leave the nurses free from concerns about them waking and can therefore devote their time and energies to their other nursing priorities.

Another associated observation, noted by all the nurses, was the reduction in the volumes of sedation patients appear to be receiving currently. One nurse commented on the changes she has noticed in her six years working in ICU:

"When I first started here patients were on like 30 [millilitres per hour] *or 40 of Propofol, 5 of Alfentanil and they were 'flat' for days and days and days, and now they're not..."* (Interviewee 012)

The nurse's observation rightly fits with the current aims in ICU to reduce the dose of sedation delivered to patients, where it is appropriate. Reduced doses of sedation results in a more 'wakeful' ICU population. Indeed, one nurse, with thirteen years' experience, describes this as the most significant change he had noticed in his practice:

"... things have changed, patients are kept more awake now and generally that's a good thing." (Interviewee 010)

Once again, this nurse's experience reflects current research evidence, wherein keeping patients more awake is deemed to impact positively upon their clinical outcomes. The researcher draws the reader's attention to two keywords in this quotation. The nurse suggests 'wakefulness' is "*generally*" a "*good thing";* indicating that there are occasions when more wakeful patients are not favoured. Another nurse describes how quickly today in ICU sedation is reduced and patients encouraged to waken:

> *"It's definitely changed...,* [you] *kept them asleep, you wouldn't have them opening their eyes really,... you'd have them on a SIMV*[22] *or more controlled ventilation, rather than ASB*[23]*...now* [you] *...try and get the sedation right down..."* (Interviewee 014)

The three areas identified by the nurses, reduced paralysing agent use, reduced doses of sedative and increased wakefulness, sit nicely together in terms of the current evidence and guidance (Jackson et al. 2010; Kress et al. 2000; Girard et al. 2008), yet none specifically highlighted sedation holds at this stage. However, beneath the changes the nurses describe, there appears an undercurrent of reservation. Exactly why the nurses have these reservations about the 'newer' approaches to sedation management and demonstrate fond memories of the 'old' days was not made explicit but underlying issues of patient safety, workload and reduced staffing numbers became frequently mentioned concerns and the achievement of 'optimal' sedation, however defined, manifested itself as a daily struggle for the nurses. Notably, these nurses had between 6-18 years ICU experience, 'expert' nurses, whom would have had different experiences of sedative practice to draw upon and perhaps would have noticed the most distinct changes in nursing practice as a result.

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[22] SIMV: Synchronised intermittent mandatory ventilation (SIMV). With SIMV, the mandatory breaths are synchronised with the patient's own inspiratory effort which is more comfortable for the patient.

[23] ASB: Assisted Spontaneous Breaths - this is also known as pressure support ventilation. A preset pressure-assisted breath is triggered by the patient's own inspiratory effort. This is one of the most comfortable forms of ventilation. The preset pressure level determines the level of respiratory support and can be reduced during weaning. There are no mandatory breaths delivered, and ventilation relies on the patient making some respiratory effort. There is, however, no back up ventilation should the patient become apnoeic.

7.3.3 Optimal Sedation

There is considerable discussion in the literature around ensuring a patient is optimally sedated (Jackson et al. 2009). The interviews revealed how the nurses themselves defined an optimally sedated patient and the attributes and characteristics they would recognise if, in their terms, their patients were optimally sedated. The achievement of optimal sedation is multifaceted and there was disagreement amongst the nurses about what constituted 'optimal'. However, they all deemed it to be influenced by the individual patient but varied in their views of the correct way to assess a patient's sedation status. The nurses often used the words 'nicely sedated' or 'comfortable' interchangeably to define an 'optimal' sedation level. Furthermore, it emerged that the nurses' nursing experience had as much of an influence on the assessment of 'optimal' as the patient themselves.

7.3.3.1 'Optimal' differences

These nurses describe what they believe constitutes an optimally sedated ICU patient in their 'world':

" I think if they're comfortable,... they are not agitated and they're not distressed and they're not having that knock on effect on their cardiovascular system or their saturations , I don't mind them sitting up reading their newspaper looking at me ventilated, I think as long as they're comfortable, it's getting that balance between that and agitated." (Interviewee 008)

"Comfortable, settled, co-operative, and rousable...I'm very happy with somebody that is awake and opens their eyes and communicates with their family, as long as they're not chewing on their tube, they're not coughing on their tube constantly..." (Interviewee 014)

Both the nurses are happy for their patients to be awake, but the assessment of what is 'comfortable', the descriptor used by both, was essentially subjective. The nurses each had over six years' ICU nursing experience which may influence how they manage their wakeful patients.

This nurse refers to the RASS score when describing her perception of optimally sedated patients:

"I suppose on a RASS, anything from around -1...where your patient is drowsy but rousable and manageable, not confused or agitated and able to tolerate the kind of the care that ICU demands, like tolerating an ET tube without being over-sedated; that they're lightly sedated." (Interviewee 016)

Similarly another nurse refers to the RASS score, but in contrast she describes those patients with a RASS score of -3, -4 or -5, deeply sedated states, as more optimal for *her* practice; she also, whilst laughing, notes that patients receiving a paralysing agent are optimal too sometimes:

> *"...* [paralysing agent] *just makes your day a bit easier because obviously you're not worried, you're concentrating on stabilising your patient, optimising your patient and having your patient nice and sedated; you're not worrying about them pulling their tube out. When patient's first come in they're moving around and coughing and gagging on their tube, they're de-saturating, their heart rate's up, their blood pressure's up, and you know it* [sedation] *can make them a little bit more comfortable... you just want them nice and sedated."* (Interviewee 012)

The nurse favourably recalls caring for patients receiving a paralysing agent in addition to sedatives, which made her laugh and visibly feel uncomfortable with her own honesty, similar to that identified earlier. She describes that a deeply sedated patient ultimately makes a nursing shift easier; they do not have to worry and be distracted by the patient possibly waking, moving and unintentionally removing essential lines and tubes. An overarching theme here is the maintenance of patient safety rather than a lack of current research based knowledge or 'being lazy'. Patient comfort is also elicited as an important perception of optimal sedation; the nurse appears to be conveying that she perceives the deeper levels of sedation are more comfortable for the patient. This highlights the issue of how patients 'look' and what is 'good' for them, the evidence argues that although the patient may well look comfortable, over sedation is as detrimental to a patient's well-being. The comparator though, a patient whom is moving around and at risk of *"pulling their tube out",* a patient who is under sedated visually looks more distressing is more difficult to manage, and is distracting for the ICU nurses. Furthermore, this nurse suggests that higher levels of sedation are *required,* especially when a patient is initially admitted to the ICU as this is a period when patients are unsettled, are most acutely ill and when deeper sedation states are acceptable. It is the period when most potentially 'uncomfortable' therapies are used, including, and especially, mechanical ventilation. In addition, as the patient is an 'unknown' entity at this time it could be argued that sedation requirements may be the most difficult to assess given the uncertain patient sensitivity to sedatives. Although, arguably it is possibly the time when over sedation may be more likely to occur. It would appear that a patient who

is deemed optimally sedated in deeper sedation states means that the nurses can devote their time to other nursing tasks, such as "*stabilising your patient*". This example supports the notion argued in the literature review, where it was described that nurses sometimes viewed technical tasks as more important than basic nursing care (Alasad 2002). However, as Galvin (2010) argues there are times when this is well justified. The achievement of 'optimal' sedation states, are deemed by the nurses as a very individually tailored care process, perhaps demonstrating why the drive to optimise sedation in ICUs has been less than straightforward.

A disparity has arisen in regards to what is 'optimal' for individual nurses. Is an optimally sedated patient a comfortable patient without visible agitation and a decision seemingly based on sound and experiential clinical judgement? Is it a 'lightly sedated' patient, assessed as being within the optimal range of the RASS assessment; 0 to -2? Or perhaps it is a patient perceived as being safe and facilitating the nurses' role to attend to other patient related tasks; assessed as within the deeper sedation levels of the RASS assessment; -4 to -5? Despite the current evidence, it appears that some of the nurses tended to consider comfort as associated with deeper sedation or even merely the absence of agitation and patient discomfort perhaps? It is possible that the consequences of such over sedation reported in research evidence may not be fully embedded in the ICU nursing community, but also it cannot be disputed that a deeper sedated patient does visually appears more comfortable.

7.3.3.2 Nurses' use of sedation assessment tools

Although sedation scoring systems are advocated as objective measures of sedation status, and are part of current best practice to achieve optimal sedation for ICU patients (Jackson et al. 2009), there is a clear inconsistency appearing across the nurses' practice in relation to sedation management. Although the RASS assessment tool clearly includes agitated, optimal and over sedated levels, the nurses' perception of 'optimal RASS' was diverse; some nurses felt the deeper levels were 'optimal'. One nurse acknowledges these discrepancies across nursing practice:

"I think it is easier if you have been with that patient the day before and you've seen what they're like. It is very difficult to come in after half an hour and they [Doctors] *are saying do a sedation hold, because you don't really know that patient, you're only taking what is*

documented down... but you know the parameters are good for all your RASS and your GCS but some people do kind of document things differently" (Interviewee 007)

Here the nurse also acknowledges that 'knowing' her patient and her clinical experience assists her to assess and make decisions about sedation. She uses this knowledge in addition to the RASS and physiological parameters to instil confidence in her decision to reduce sedation. This personal 'knowing' was highlighted as an important underpinning to nurses' patterns of knowledge examined in Chapter 7.1.

Interestingly, the use of the Glasgow Coma Score (GCS)[24] is still used to assess sedation status, although it has long been assessed as a poor indicator of neurological status in sedated ICU patients (Price, Miller, & deScossa 2000). It perhaps indicates a feeling of security with a familiar tool amongst the nursing staff, despite it being deemed useless in this group of patients.

7.3.3.3 Patient considerations in the pursuit of optimal outcomes

It emerged that in the pursuit of 'optimal' sedation the nurses also considered the patient's perspective in sedation management, particularly how they may feel being awake in ICU:

"...I don't think it's nice for the patients to wake up suddenly, like I think of my patient today, he is waking up suddenly and then drifting off and it's not nice for him..." (Interviewee 004)

"...does it help the patient being woken up every day? I don't know if that's coming back yet, are we kind of getting to that stage that the patients are remembering the wakening periods, I don't know if that is helping them or not..." (Interviewee 006)

Here another role of the nurse has emerged, acting as their patients advocate. They want to act in such a way that desired outcomes are achieved for the patient during their time of critical illness, when the patient cannot make decisions for themselves. Interestingly, the outcomes the nurses consider are not just the long term clinical benefits such as reduced time requiring mechanical ventilation and reduced stay in both ICU and hospital; those promoted through research based evidence. Patient's views of wakefulness must require further investigation but are beyond the scope of this study.

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[24] GCS: The Glasgow Coma Scale (GCS) is a 15 point assessment scale to monitor levels of consciousness using patient's eye, verbal and motor responses. The higher number of points the more conscious a patient is deemed to be.

7.3.4 Over Sedation

The issue of over sedation, despite the negative consequences was not a concern that emerged strongly through the nurses' interviews. The avoidance of over sedation appears, in a sense, 'over shadowed' by the need to manage and avoid agitated states as a result of a reduction in sedation. Arguably, in comparison to agitated states, it is much easier to overlook over sedation as the patients look visibly 'comfortable', and thereby even a state that nurses may favour? Consequently very few of the nurses used the avoidance of over sedation to illustrate their perceptions of an optimally sedated patient, irrespective of a wealth of evidence highlighting the negative effects associated with over sedation for patients. By favouring deeply sedated states as more 'controlled' and a 'safe' environment over sedation would not raise behavioural concerns despite cognitive awareness of adverse effects. Therefore, it is not entirely unexpected that very few of the nurses interviewed identified over sedation of patients as important to avoid. Only one nurse includes a reference to avoiding over sedation in his description of an optimally sedated patient:

"... [I'd be] *happy as long as they were answering questions ...appropriately and if they were equipment comfortable...but that they weren't forced into unresponsiveness by the sedation"* (Interviewee 013)

He continues, reflecting upon his nursing experiences and that perhaps prolonged over sedation is linked with the other negative effects of sedation, such as, paradoxically, the agitation feared with under sedation:

"My experience tells me that sometimes agitation is a result of over sedation sometimes...sometimes if you stop the sedation altogether you can find the patient isn't agitated, delirious or confused..." (Interviewee 013)

Furthermore, this nurse acknowledges the negative impact that over sedation can have, such as being able to assess a patient's pain levels and perhaps mask underlying issues.

"...you want to keep the patient safe, safe enough where they can't pull that tube out or you can get there in time for their hand, but then not so sedated where they don't even flinch to pain..." (Interviewee 012)

7.3.4.1 Sedation, night time and sleep

Another nurse described over sedation occurring at night. Patients are often much less stimulated by clinical interventions overnight, undoubtedly increasing the

opportunity for over sedation to occur. Night shifts also try to promote a quieter and more restful environment, than can be offered during the day in ICU, to aid patients sleep. However, this nurse suggests that 'sleep' is maybe being pursued with an overindulgence of sedatives in some instances:

> *"... I know in some units I have heard ...that they do sedate the patients overnight... I think we're okay here but I don't agree with the concept of just putting sedation up to have an easier night, because you're here to do a job..."* (Interviewee 007)

The deeper sedation levels are again described in terms of an "easier" state for nurses to 'nurse'; compared with the wakeful population now being promoted. The argument that deeply sedated patients at night provide them with 'sleep' is not supported by any research evidence. In fact, sedation-induced sleep is not natural sleep and therefore does not offer any of the benefits that natural sleep does (Rowe & Fletcher 2008). This illustrates the fine line between the encouragement of 'sleep' and 'rest' whilst simultaneously ensuring optimal sedation.

In the promotion of a more wakeful population nurses are ideally placed to ensure sedation management is individually optimised (Benner 1984a). However, as indicated, the perception of optimal varies considerable amongst the nurses interviewed. The nurses appear to have difficultly balancing the need for patient comfort and safety whilst avoiding the real concerns of over sedation. Over sedated patients visually present themselves as comfortable, peaceful and safe. They also offer the nurses less stress and are not a burden on their, or their colleagues, workload. It is easy to see why in clinical practice over sedation is not only overlooked but also accepted practice by the nurses at the patients' bedside.

7.3.5 The challenge of sedation holds

The optimisation of sedation has been strongly linked to the use of sedation holds, a practice that contrasts with the more conventional gradual reduction of sedation and the 'weaning' off ventilator support. The literature review illustrates the evidence for sedation holds highlighting the positive long term outcomes of this newer practice. Although currently, sedation holds are a daily occurrence, or at least a daily consideration, as part of the care provided to patients in ICU, the adoption of this practice has been a slow process. The nurses interviewed expressed differing

feelings and opinions in relation to sedation holds as to how they are performed, who should be performing them, when they should be performed, and who should be providing the support for this intervention. Such probing questions stirred a number of emotions, not least an embedded fear and perceived loss of control surrounding the performance of sedation holds, whilst simultaneously experiencing a sense of obligation to perform such holds against the evidence arguing improved patient outcomes and arguably the pressure of organisational targets.

7.3.5.1 The purpose of a sedation hold

The concept of sedation holds first arose over a decade ago (Kress et al. 2000). However, the current driver behind sedation holds in this study's ICU is the Scottish Patient Safety Programme (SPSP) in a bid to reduce ventilator associated pneumonia (NHS Quality Improvement Scotland 2009). However, none of the nurses interviewed describe this as the key benefit or a reason that influenced them performing a sedation hold. Probing the nurses' revealed different insights into their 'world' making known their perceptions and understanding.

Certain benefits, in terms of 'outcomes', of sedation holds appeared to be widely recognised by the nursing staff interviewed. The interviews drew out a perception of benefit for their patients:

"... they can test a patient...they can try see how the patient is going without ventilation...if they can breathe then they can maybe sometimes be able to extubate[25] a patient easily." (Interviewee 011)

"I think it makes sense ...patients have no idea what's night, what's day, they're so confused ...disorientated and agitated because they are just completely sedated for ...'X' number of days and then they're suddenly woken up, bolt upright ...I think this is a step forward really. From a nursing point of view it just makes more sense." (Interviewee 016)

"...I'm quite a fan of the sedation holds, just to stop it altogether…I've done a bit of reading about it and I gather there is quite a lot of evidence for just stopping sedation rather than gradually reducing it.... It's quite a satisfying thing to see a patient going from writhing around the bed to having a conversation with you in the space of two hours..." (Interviewee 013)

[25] Extubate: Removal of the endotracheal tube that facilitates mechanical ventilation as the patient is no longer requiring invasive mechanical ventilation. This is usually a planned event, although sometimes patients will self-extubate, which is termed unplanned

Closer consideration of the nurses' perceptions of the benefits of a sedation hold reveals additional benefits. One nurse sees it as an intervention to enable her patient to be extubated. Extubation and self-ventilation enables patients more readily to be discharged from the ICU; therefore there are organisational influences underlying this perception. Another nurse is driven by a sense of satisfaction when, despite the recognised concern over agitation, "*writhing around the bed*", he feels this will progress to represent improvement. The question of decision making confidence is further explored, as although stating he is quite a fan of sedation holds this nurse does not verbalise total surety with his words "*I gather there is quite a bit of evidence...*".

Clearly, the outcome of, in due course, facilitating 'extubation' or at least assessing for this development, was perceived as a benefit of the sedation holds:

> *"...it* [extubation] *might not be the immediate outcome you want...it* [sedation hold] *gives you the opportunity to assess what a patient's 'neurology' is like and how they can function without sedation...and* [you] *can extubate them or...*[if] *it's not so good ...re-sedate them again and find out what they're like tomorrow or the day after."* (Interviewee 013)

Neurological assessment is, therefore, also perceived as a reason for sedation holds. Here another nurse describes being influenced by a 'plan to extubate':

> *"I thought about it (laughs)* [performing a sedation hold]. *His sedation went back on at 5* [millilitres per hour] *because he was starting to get quite light and reaching for his tube quite a lot, so what the nurse overnight had done was put it on, just on at 5mls/hr ...when I assessed him this morning he was really just ideal in my eyes. He was obeying commands, he was opening his eyes, but he is really sick...I didn't think the plan would be to waken him up and extubate him at all. In fact, as the morning wore on, I knew more and more that wasn't going to happen so I thought why make him agitated, why put him through that period when I know we have just started the sedation again to make him comfortable."* (Interviewee 005)

The nurse perceived their patient to be too sick to extubate and that their sedation level was 'optimal' to facilitate their care, reflected in the ability of the patient to open his eyes and obey commands. However, once again the nurse immediately associates agitation with a sedation hold and considers that he is fulfilling his role as his patient's advocate by not subjecting him to potentially distressful agitation when he, in the nurse's professional judgement, is already 'optimally' sedated. However, reflection upon this nurse's quote makes the researcher question if his patient described as obeying commands and on light sedation - *"just 5mls/hr",* is truly indicative of a patient likely to become agitated following a sedation hold? Rather is

the nurse perhaps just harbouring fear, perhaps from previous experiences, of performing a sedation hold and its uncertain consequences, or that he equates a sedation hold to always result in agitated behaviour? Moreover, and perhaps more importantly, the nurse's patient does not appear to actually fit the description of a deeply sedated patient; patients in which the evidence of sedation holds has been developed to benefit.

An interesting and significant question that emerges from the nurses' reservations of sedation holds, is whether they see the periods of agitation as the end point of the sedation hold rather than a more 'optimally' sedated patient and/or a patient whom can be extubated? It could be argued that even if agitation is the immediate end result, the sedation hold has had the desired effect. From the nurses' perspective though, as the patient's advocate, this is a difficult role. They know that there are benefits for patients that undergo a sedation hold but they also are aware of the reality of agitation distressing to observe, and thereby deemed as distressing for the patient. Research evidence to support this intuitive deduction is still to be fully established (Girard 2009;Oeyen et al. 2010). What appears to be emerging is a picture of ICU nurses who have a confused understanding of sedation holds as entirely for extubation purposes, and if this doesn't occur, merely an unnecessary cause of agitation. The nurses concern with agitation is a significant one and is explored in further detail later.

There is an obvious uncertainty about the meaning of a sedation hold. One nurse indicates that the variable sedation hold practice seen may be a result of a lack of education amongst nursing staff and guidance surrounding the plans following a sedation hold:

> *"...I think people forget that it* [sedation] *can go back on. I think they think sedation hold that's it off now...we're not going to put sedation back on... I think it just sometimes needs more clarified… especially ...because ...you think,' sedation hold?!' they are nowhere near extubation!"* (Interviewee 007)

A lack of confidence among nurses in the medical decisions surrounding sedation holds is illustrated here, in relation to resulting in an optimal outcome for their patient. Four possible reasons for this can be seen to emerge: first, the nurses' may have previous bad experiences of sedation holds, second, the bedside priorities

regarding the outcome of sedation holds between nurses and medical staff differ, third, a lack of understanding of the research evidence surrounding purpose and process of sedation holds, and fourth the loss of control, autonomy and overall ownership the nurses perceive themselves as having over a patients sedation. Although emerging as common themes, these issues were not universal among the interviewees, illustrated as follows:

"I think I find a sedation hold much easier because you can just switch it off, they wake up, and you see where they are and then you can also then re-sedate appropriately. While if you wean it down I think it's just gonna take you forever and where do you stop, and when I did a sedation hold a lot of times I did not have to go back in as high as you had to before." (Interviewee 014)

The purpose of sedation holds has clearly revealed variable understandings amongst the nurses interviewed. A theme of agitation as an end point has certainly arisen with the nurses feeling they lack guidance and control about how to manage such behaviours. As a consequence the dominant picture is one of reservation and lack of autonomy in sedation hold decision making.

7.3.5.2 The unpredictable response

The experience of previous 'agitation' proved a potent factor in the nurse's negativity towards sedation holds. One nurse suggested certain patient groups were more likely to be agitated and unsettled:

"Drug overdoses are quite difficult... you don't want to stereotype people but you know that certain people are possibly going to behave a certain way....drug overdoses might be a problem when you switch their sedation off, so you might think well it is 6 o'clock in the evening, maybe I will just leave it to the next day. Not that I would ever do that of course. (laughs) ... there is a bit of fear probably surrounding what the patients are like and how much sedation they've been on and the uncertainty of how they are going to react." (Interviewee 009)

In addition, there were times where agitation was not the key factor. The nurses felt it was just *inappropriate* to wake some patients; rather it was the patient's clinical condition, as these nurses describe:

"...someone whose chest is really fragile, and also if they're paralysed... like an ARDS or someone whose chest is really fragile and you want to fully ventilate them and settle them ...I think these patients should be a bit more sedated than others I've got a big thing about if a patient is distressed..." (Interviewee 007)

"There are two types of patients that we are looking at. There are the ones who do need sedation holds to [see] *whether they are awake underneath there....However, there's still the patients that people want to do sedation holds on and they are absolutely nowhere near extubating, they are on really high ventilation, they are really sick and they are trying to do sedation holds on them and it actually puts them back"* (Interviewee 006)

The nurses are concerned about patients being distressed and being 'set back' as a result of, what they perceive as inappropriate sedation holds; they appear to be grappling with their previous experiences versus the objective evidence. Furthermore, for certain patients the nurse fails to see what benefits their patient is reaping. Considering the original sedation hold evidence (Girard et al. 2008; Kress et al. 2000) this is a valid concern. The safety issues relating to the performance of sedation holds on the sicker and more complex patient group are as yet unknown (Pun & Dunn 2007). In addition, some nurses only perceive a sedation hold beneficial if it achieves an outcome *they* perceive as positive such as, extubation.

7.3.5.3 Decision making surrounding sedation hold 'suitability'

Surprisingly, the nurses had difficulty verbalising what type of patients *were* suitable for a sedation hold in comparison to those who they felt apprehensive about performing sedation holds on. They often paused and referred to 'just knowing':

"…it's difficult to quantify. I don't know...you would just look at the patient and think yes they're ready for a sedation hold I suppose. Someone who is...post-op patients there are a lot of exclusion factors I guess head injuries... ICP problems, patients who are not going to be weanable from ventilation potentially in the next couple of days, I personally wouldn't bother doing a sedation hold, although you might just want to assess neurologically. Anyone really that you wanted to assess neurologically you would do a sedation hold on them. I don't know, it is difficult...I would just go to the patient, and have a look at them ……" (Interviewee 009)

These intuitive judgements link with the literature surrounding expert and novice practitioners examined in the literature review. One senior experienced nurse struggles to vocalise exactly how he deems a patient is ready for a sedation hold. He just knew. He understood without a rationale (Benner 1984). I probed him further asking exactly what he looked at to aid his decision:

"I would look at what ventilation they're on... what other meds they are on... at what their obs [vital signs] *had been, ...at their history, why they're in here...all kinds of things and base my decision on kind of that really..."* (Interviewee 009)

He describes a combination of ventilation, physiological parameters, pharmacology and past medical history to inform his decision; it is multifaceted. The experienced nurses' decision making appears a complex process; they draw upon their 'lived experiences' and their knowledge. The initial struggle to describe the patient factors influencing his decision may indicate the use of sub conscious, embedded knowledge gained through his experience, resulting in an 'auto-pilot' effect occurring; recognised in the literature (Benner 1984). In contrast this far less experienced nurse proposes that there are few people who should not undergo a sedation hold:

> *"I don't think there are many people that are not appropriate for a sedation hold... I wouldn't hold sedation on are those who are going back to theatre, because I don't want to wake them up, extubate them and then send them away to an anaesthetic room to get re-sedated"* (Interviewee 013)

The above nurse does not allude to ventilatory or clinical conditions as exclusions; he seems to suggest that only if a patient is requiring further planned surgery they should be excluded. This illustrates a less experienced nurse's decision making process, failing to demonstrate advanced levels of knowledge and skills linking with appropriate practice (Benner & Tanner 1987a). Moreover, the outcome of extubation was once again mentioned, indicating a lack of knowledge surrounding the primary purpose of a sedation hold too, although this too may be an indication of the nurses experience again, it also signifies a need for education. Similarly, it was elicited from this nurse that he too felt that all patients could benefit from a sedation hold:

> *"I think a sedation hold is always appropriate to try... maybe to do a five minute sedation hold to see what is gonna happen, but sometimes in patients who have had sedation holds past few days, and every day they either just 'fall off their perch' ...breathing wise or in other ways, I think you know when it's just not appropriate and the patient needs maybe another 24 hours of being properly sedated"* (Interviewee 015)

The nurse reflects that if he is aware that the patient has failed, "*fall off their perch"*, sedation holds previously it would make him feel less inclined to try again. The length of a sedation hold is a factor that was not mentioned by any of the other nurses, the same nurse suggests five minutes. However, this may not be long enough for a patient to regain consciousness as multiple organ failure, experienced by many ICU patients, delays the metabolism and excretion of medications. The nurses' seem to draw upon different elements to make their decisions regarding sedation holds,

perhaps highlighting again the presence of inadequate education around the 'nationally driven' process.

7.3.5.4 Summary of 'The challenge of sedation holds'

Although the evidence supporting the concept of sedation holds is not new, its translation into clinical practice is still relatively novel. Confusion over their purpose has emerged from the nurses interviews. The expectation of extubation is conveyed as an important consideration by the nurses. However, such perceptions are not completely unfounded as the concept of 'weaning' from mechanical ventilation and ultimately extubation are strongly linked in both the national safety programme (SPSP) and in its rationale. Equally for the nurses, certain patient groups evidently present impediments for performing sedation holds for the nursing staff too. Arguably, in the nurses' defence, some of the patients they describe feeling apprehensive about sedation holds being performed on are in fact not the defined group of patients that were subject to the sedation hold research, such as those with neurological injury. Against these reservations is the compounding potent effect of previous negative experiences with sedation holds and the totality of their behavioural reactions, judgments and decisions appears to be at odds with that of the medical team. The apparent variation and uncertainty expressed by the nurses indicates that the sedation hold process, which is being applied to all patients, may need to re-look at the education given regarding its aims, and the tools it is using to achieve these.

7.3.6 Wakefulness and the world of the critical care nurse

Wakefulness has, arguably, transformed the ICU patient population. The image of ICU patients, non-communicative, lying 'straight in their beds' and looking peacefully asleep is outdated. Independent of the specific concerns with the use of sedation holds, patients are now purposefully woken and managed with less sedation as recommended by current best research evidence. Patient 'wakefulness 'has changed the nurses 'world'. The interviews explored these changes allowing the impact and implications of them to emerge. The specific features that emerged were: (a) the impact of the oversights, and subsequent constraints, applied by the healthcare organisation, (b) the complex and unrelenting power perceptions and

conflict between the doctors and nurses roles, (c) the nurses 'reality' of caring for 'agitated' patients, and (d) the journey of emotional turmoil the nurses are currently enduring as a result of wakefulness. Fundamentally, this section offers different perspectives on and insight into, the patient safety programme, the ultimate driver behind patient wakefulness.

7.3.6.1 The constraints of the organisational demands

As outlined in the literature review, the bureaucratic demands in healthcare in the 21st century are illustrated by such targets as through put and waiting times. Healthcare is economically driven and underpins the structure of nursing care today. It has even been argued that this has led to patients losing their individuality (World Health Organisation 2007) and essentially becoming seen purely in terms of numbers. This can be applied to the notion of sedation holds and the aim to reduce mechanical ventilation for patients and ultimately discharge them from ICU and hospital earlier. The 'pros and cons' of sedation practice changes in ICU were described by the nurses whereby it was articulated that the heart of *any* practice change should be to primarily ensure that the patients reap the benefits of the changes implemented. Nevertheless, the influence of healthcare demands, such as national targets and safety programmes which include the implementation of sedation holds, seemed an unavoidable consideration in the ICU nurses' practice. This nurse describes the benefit of such a target:

"I think we are trying to use less sedation and hopefully that is going to reduce the time that patients stay here, which is good." (Interviewee 009)

It may be argued here that the *"good"* to which the nurse refers could be either from an organisational perspective, a patient outcome perspective or maybe both; it is difficult to establish which the priority is. Further probing elicited that he was taking a holistic view:

"Good for the patient primarily obviously, good for the patient's family, good for us, good for em... whatever targets we might have, patients through the door, big knock on effects, good for A & E, they can get patients up here quicker if we have got empty beds." (Interviewee 009)

It is interesting to note that for this senior experienced nurse, there are a number of organisational factors and targets considered in his clinical decision making.

Nowadays nurses have had to build in organisational needs more heavily into the changes and decisions surrounding patient care. It could be argued that the nurse's comment "*patients through the door*" is, in a sense, reducing the patient to a number and dehumanising them, something that ICU technology was accused of in the literature review (Wilkinson 1992). It may also be an insight into the way in which not only nursing is heading, but healthcare as a whole due to the increasing demands placed upon it. Furthermore, current research evidence is beginning to suggest that simply transferring patients from ICU and discharging them home earlier has its own set of problems. The long term effects, physical and psychological, that many ICU patients experience are now being recognised as just as important as short term goals such as earlier discharge from ICU. Longer term quality of life issues for ICU patients, although not addressed in this thesis, are gaining public and professional interest (Girard 2009; Oeyen et al. 2010). It appears, currently, that at a health service level patient centred outcomes have a tendency to be overlooked and these only seem to be being addressed in research studies.

7.3.6.2 Wakefulness and Workload

A more wakeful ICU population was described by the nurses as being more demanding; it increased their daily workload. They described spending more time calming and reassuring their patients who were regaining or had regained consciousness as a result of sedation being reduced or a sedation hold. It is important to note at this point that the halting of sedation is not directly related to a patient no longer requiring mechanical ventilation. Patients' may still require the assistance of mechanical ventilation for a number of days or even weeks. This in itself has implications for the nurses' role, others perception of their role and the perception of what is 'critical care', all having undergone change as a result of a wakeful population. Here two nurses illustrate how more wakeful patients necessarily require more attention:

"...some patients if they are awake it's okay...agitated patients it's difficult for you having to be near to the patient all the time, you can't move away, you have to stay close to the tube..."
(Interviewee 011)

"I can appreciate all the research since and I am sure it is better, of course it is, just tougher [Interviewer: Tougher for whom?] *The nurse and possibly the family...patients if they are on*

the ventilator for less time well then it's not tougher for them it's just short term pain for long term gain if you like, it is probably more stressful all round..."(Interviewee 008)

Coming through their words is a sense of lack of confidence. *"Tougher"* is an interesting notion, could this reflect nursing as a profession becoming more challenging and harder work? The nurse describes maintaining a holistic approach, referring to the patient's family in addition to the patient themselves, as experiencing greater stress. This would indicate that in addition to assisting patients through the agitated periods, they also have to reassure patients' families. It should be noted that the notion of wakefulness and sedation holds are not synonymous although inarguably linked. The increasing culture in ICU is now to reduce the use of sedation, as 'optimal', and by virtue of this have more wakeful but still critically ill patients. Sedation holds are a process that is now considered daily for every ICU patient, as deemed best practice. Sedation holds are a means to avoid unnecessary over sedation. However, the nurses appear to be suggesting that even patients who are not over sedated are being subjected to sedation holds. This is leading to rousable and/or awake patients becoming unnecessarily agitated. It is this type of 'wakefulness' that the nurses describe as having the greatest impact and implications on the care they are able to provide. One nurse indicates that it may be the associated increased workload, due to an inevitably more wakeful patient, as a consequence of a sedation hold that militates against their desired level of care:

"... if they're more awake, they're gonna be more at risk...be more agitated,... be more unsettled, they're probably going to cough more... It's more difficult...it's more stressful for yourself, and you can't do your things, because you need to go and attend to the patient, make sure they're safe ... not pulling their tubes...You suction them more often because obviously their cough reflex is much higher, also you may be more frustrated because you feel you can't really help the patient, the tube is in there, if it's not gonna change at the moment... the only real thing you can do to help the patient is give them sedation if it's the tube that's bothering them" (Interviewee 014)

Agitation is an unwelcomed negative behaviour. Safety, key to the nurses' care goals, is compromised with agitation. It appears that preserving patient safety, due to 'wakefulness', prevents the nurses from being able to perform their other duties. They feel that their workload has increased because it is much harder for them to fulfil *all* their nursing duties, do the job expected of them, *and* keep their 'wakeful' patient safe. The notion of advocacy is also identified, the nurse describing feeling helpless watching their patient's intolerance of their endotracheal tube. The

following nurse describes that his decision to perform a sedation hold is highly influenced by his workload:

> *"... how busy you are definitely, how much risk you think the patient is going to be in terms of actually waking up and pulling their tube...often the patients seem really appropriately sedated when you come on and you think why would I want to stop it?"* (Interviewee 005)

It could be perceived here that the nurse is more concerned with their workload than the patients' best interests, influenced by the organisational structure, wherein there are expectations for them to have achieved or performed certain aspects of care during a nursing day. His perceptions of sedation holds also emerge as, in his view, the patient is already optimally sedated so why would he want to compromise their safety and introduce the fear of the patient distress? This point was alluded to earlier and raises an important issue about the necessity in an 'optimally' sedated patient; calm but rousable bearing in mind that the evidence base for sedation holds was in a population of far more deeply sedated patients. Today's ICU populations are, arguably, not a comparator. The nurses themselves argue for more individually tailored sedation practice but despite probing none raised the reservation, noted above, as to the research evidence. Their potent experiential learning drove their concerns. Notwithstanding, as emerged earlier, 'optimal' sedation, can still be a very subjective experience and assessment.

Staffing levels

It was evident from probing that insufficient staffing levels contributed to the increased workload the nurses described:

> *"...when patients are awake they are more likely, they are more prone to reaching for their tubes, you've got to watch them more, there is less staff, you're covering people all the time..."* (Interviewee 005)

> *"...we are to keep an eye on our patients and just because of it getting busier, and busier in here, we have got no runners[26] a lot of the time, having to cover breaks that are involving cubicles, stuff like that, it is just taking our safety which I try and advocate all the time because ultimately you need to be able to see your patients"* (Interviewee 006)

The problems with staffing are evident across nursing practice (Endacott 1996). We have an ageing patient population; advancing technologies to preserve lives, but

[26] Runners: A nurse(s) who do not have allocated patients, but who check drugs and infusions, help set up equipment, assist with more dependent patients and cover meal breaks

alongside a perceived diminishing nursing workforce as a consequence of the economic down turn; an issue that for the foreseeable future will remain unchanged, if not worsen. References to lack of adequate staffing figured largely across the interviews depicting its implications for their practice and their patient's safety. A pursuit of a wakeful ICU population appears, from the nurse's perspective, to require more nursing staff, and certainly not fewer. What is more, the nurses suggest that even the 'status quo' of staffing is currently unsatisfactory in view of the current sedation practice changes. Nurses describe feelings of anxiety watching 'multiple' patients, are distracted from other nursing duties and compromising safety. The distraction from other nursing duties is an interesting notion, particularly in view of the debate in the earlier chapter regarding technology 'swamping' a nurse's time. It appears that the patient safety related sedation practice changes being integrated into ICU, have uninvited, distracting qualities too. The irony is not lost on both the researcher and the researched, that patient wakefulness is being driven by a 'safety' programme, a national vision, yet the nurses convey feelings that their patients and their own safety is at times being jeopardised as a result. The former appears to have a stronger voice than that of the nurses, who actually perform the sedation holds as part of the programme. A study, described in the literature review, that neatly illustrates the need for extra nursing staff as a result of less sedation is that of Strøm and colleagues (2010). Their ICU had a long standing protocol of no sedation in place and although its use demonstrated a reduction in ventilator days for patients they also required additional nurses to manage agitated behaviours as a result.

7.3.6.3 The sense of obligation

A strong theme elicited from the nurses' was that of obligation. There were a number of drivers for this notion of 'obligation' that the nurses perceived. The nurses described feeling that they were expected to perform sedation holds each day on their patients:

> *"Well now we do the sedation hold everyday and sometimes ...I feel obligated to do a sedation hold even if sometimes I don't feel like that it's a good thing to do because of safety...I don't know how exactly this person is going to respond to this. I just feel that it is quite a ...and we have to just be ready for them to do whatever... and I just feel it is not safe"*
> (Interviewee 004)

"...medical staff and I think sometimes the nurses in charge will come round in the evening and say did you do a sedation hold and you say "no" and they are like "well, why not?" and you think well .... You feel you have to justify it... I don't know, you are expected to do it somehow." (Interviewee 005)

Obligation is compounded by the nurses' feeling unsupported by the medical staff, from whom the obligation stems; the medical staff are perceived as the drivers behind sedation holds. Interestingly, one nurse describes that she also feels a pressure to perform sedation holds from senior nursing staff, suggesting that the senior staff may be under similar pressure from the medical staff. However, a senior nurse did not share that obligation but could empathise why junior nursing staff do:

"Well at the end of the day it's me that's at the bottom of the bed for 12 hours, and it's me that's going to perform a sedation hold or not going to perform a sedation hold. So if the Consultant wants to come along and switch the sedation off and stand there for whatever, half an hour, an hour or two hours until it all wears off then that's fine, they can do that, but they won't. (laughs) This is anonymous isn't it... that's something that a junior member of staff wouldn't do. A Consultant will come round and say to them, I want this patient to have a sedation hold and they will just do it, and even if they thought they shouldn't have one, they would probably still do it because the Consultant had told them to. They might come to the nurse in charge and say the 'Consultant said I've to do a sedation hold, I don't think they should have a sedation hold, what do you think?'...if it was me I would support the nurse and say don't do it and get the Consultant to come and speak to me." (Interviewee 009)

The senior nurse believes intensely that, as he is at the bedside more than the medical staff and 'knows' the patient, the decisions regarding their care should be jointly made. His expertise allows him security and confidence in his decisions. Surprisingly, even as a senior experienced member of staff, he appears apprehensive about criticising doctors' practices, indicating perhaps, that the nurse doctor 'divide' remains, regardless of nursing experience. Furthermore, the sense of obligation described appears to be being compounded by the patient safety programme driving the implementation of sedation holds; proposing every patient should be considered for a sedation hold. This is despite the original research based evidence only applying the concept of sedation holds to a time when deep sedation was 'the norm'; this patient group is now a small proportion of patients cared for in many ICUs.

Power perceptions

Beneath the theme of obligation arose perceptions about how the medical staff viewed nursing staff who perhaps opposed, or failed to perform a sedation hold.

"*I think sometimes they think that we put sedation up or down because they think we just want an easy life, but they forget that we're here to do a job...we're wanting the same aim as them... to get the tube out or get the patient better. It always happens; they* [doctors] *walk past at the patient's most settled time...*" (Interviewee 007)

"Because they know they've woken up, so you're going to have to, you're going to have to attend to the patient more." (Interviewee 014)

This nurse proposes that medical staff are fully aware of the stressful consequences of some sedation holds and perceive them to be unsupportive and unsympathetic. This nurse's thoughts made the researcher consider whether the doctors either do not perceive sedation holds, and particularly the consequences of them, as an additional pressure for the nurses' or that they view it simply as the nurses' role. The researcher acknowledges that as medical staff were not interviewed as part of this study and their direct views remain an unknown. Indeed, a limitation and an area of research that should arguably be pursued is an exploration of the medical staff's world of critical care.

This nurse, 016, tries to explain why she thinks the medical staff display these behaviours and opinions towards the nursing staff: the implicit suggestion of laziness, the desire for an 'easy' shift:

"It's a strange concept I suppose ...there's a word I'm trying to think of, it's not ego, but there is a difference at the end of the day between doctors and nurses and 'we' all know there is. Maybe it's because they spend longer getting to where they are than we do from a study perspective... I think..., some of them are so, for the want of a better word 'arrogant' towards nurses." (Interviewee 016)

The researcher reflected on the concept of arrogance, and wondered if it could be understood in three different forms. Firstly, the arrogance as a result of the content knowledge base that distinctly separates nurses and doctors. Although it might be viewed as over simplistic, nurses have historically cherished a more caring and empathetic approach whereas doctors, who indeed profess caring as axiomatic, have a more objective scientific and 'cure' approach to healthcare. Secondly, arrogance as a result of their 'power' in healthcare; a theme that emerged through the interviews. Thirdly, reflecting on both the interviews and the researcher's past embedded experience, the suggestion cannot be avoided that doctors use arrogance to mask their own clinical ignorance. It could be inferred that the medical staff do not, and are unable to fully appreciate what it is like to manage an agitated patient and the

potential adverse event risk they pose because it is not a role they undertake. More generously, the same nurse continued to reason it could be something as simple as a personality clash that gives a nurse the distinct impression that doctors do not appear to listen to them:

"I suppose it just depends, for various reasons really and some of those can be so trivial as personality, you know...at the end of the day it is their decision I suppose, ...they're the ones that are driving it [sedation holds]*, so it is their decision, but I think overall, there's probably about 90% of them will listen, but there's the 10% that won't and no matter what you say it's what they want."* (Interviewee 016)

The researcher explored further, with another nurse, whether she felt that the medical staff listened and understood why she was reluctant to perform a sedation hold on a patient she deemed inappropriate, she said "*I think it depends*", when probed to find out what it 'depended' on, she said:

"The doctor ...how well you know them... how much they trust you... sometimes if people are under-confident themselves ...it's them [doctors] *being confident in trusting you and accepting what you say,... I think it depends on the medical staff..... I think trust and respect is earned over time so 'yes' experience and 'yes' getting to know people and that comes over time... "* (Interviewee 008)

Nurses were keen to divulge that in circumstances where they deemed it inappropriate for a sedation hold, for example if a patient is too sick or due imminent surgery, they would *definitely* make their concerns and reservations known to the medical staff. Other nurses even suggested they would make a member of the medical team stay at the bedside if they wanted to proceed with the sedation hold. This demonstrates more assertion by the nurses as opposed to that of subservience or of being powerless. On further reflection it could be deemed that by making explicit the reservations they held regarding a sedation hold, they could shift the responsibility should an adverse event occur:

"...if I'm adamant that I wasn't going to do it [perform a sedation hold]*, or I wouldn't feel comfortable, and he [doctor] would still want me to do one, I would say 'well, you're going to have to...all the consequences that I've been telling you ...why I wouldn't want to do it, if that's what's going to happen, then that's your responsibility that it happened and I made you aware of it', But at the end of the day...he tells me how to treat, he prescribes the treatment and if that's the treatment he wants then, there's only so much I can make him aware of, things I feel that aren't good."* (Interviewee 014)

Here the nurse is exerting some power in her role as the patient's advocate but then continues by highlighting where she perceives the limits to her autonomy to lie. The

power and confidence initially elicited is short lived and the medical staff's power appears to prevail.

Interestingly, although the nurses perceived a loss of autonomy and an obligation to perform sedation holds, changes to practice have been implemented to encourage the responsibility, and perhaps the onus of sedation holds to rest with the nurses. The paperwork the nurses are expected to complete daily indicates whether a sedation hold has been performed or not and current paperwork has been amended to include a distinct time point (midday) wherein assessments such as sedation holds, should have been performed. It was introduced in a bid to improve the poor compliance of the Patient Safety Programme's VAP bundle described in the literature review. The paperwork's options are 'yes', 'no' and 'not applicable' as to whether a sedation hold has been performed. However, it was clear from this nurse that it is only with experience that you can tick the 'No' box with 'confidence':

"I think it is like all things getting confidence in your decision in that particular area...just as you have more ...experiences when people do wake up very suddenly and it is kind of uneasy, or you just get more confidence and you are able to say I don't think this is appropriate and then you can just tick the "No" box they say have you done the sedation hold and you can say 'no'" (Interviewee 004)

Opposing sedation holds is still seen as a daunting option for this nurse, despite her five years of ICU nursing experience.

There may well be occasions in which sedation holds are contraindicated for patients' clinical condition. The nurses could clearly recall being asked to perform sedation holds on patients who are too sick and requiring high levels of ventilation. However, their opposition, drawing upon their 'knowing of the patient' and 'intuitive based judgements' are perceived as lacking scientific rigour. This raises questions about the perceived value of the nurses' clinical judgement. The literature review emphasised the importance of the nurses close patient relationships in assisting with clinical decisions, yet this seems overlooked in the instances described by the nurses. It could be argued that opposing a sedation hold based upon intuitive reasoning should not be disregarded as the nurses often have developed an in-depth 'knowing' of their patient. The nurses are on occasions going against their professional judgments irrespective of their close relationship with patients; being at the bedside

more than any other healthcare group. They feel undervalued and that any opposition they may voice is quickly disregarded leaving them with little option but to follow the orders of the medical staff. It is almost as though their role has lost its place within intensive care as far as sedation management is concerned. The power perceptions and subsequent feelings of obligation are evidently not conducive to good team working.

7.3.6.4 The wakeful patient and unintended consequences

Adverse events are an unplanned event that nurses wish to avoid at all costs. The adverse events most often experienced were unplanned extubation (removal of endotracheal tubes) or unplanned invasive line removal. These also appeared to be deemed the most serious. However, agitation in its own terms, independent of consequences, is certainly an 'event' that nurses wish to avoid too. Such agitation, often perceived by the nurses to be as a result of a sedation hold, was constantly demonstrated in the interviews as being a particularly disconcerting and negative experience in their nursing 'world'. Sedation holds, as proposed by the SPSP, were not aiming directly for a wakeful population, but indeed increased wakefulness has emerged as a consequence of this element of the SPSP's VAP bundle. Equally, the SPSP certainly does not advocate leaving patients in prolonged agitated states, yet the nurses repeatedly recall caring for patients in these exact states. Therefore despite not advocating agitated states the nurses have linked sedation holds directly with agitation. Therefore the researcher has chosen to examine the concept of agitation and its implications for the nurses under the theme of adverse events. Every nurse interviewed could describe an adverse event; they had personal experience of or an experience a colleague had experienced. Consequently, adverse events stirred emotions for the nurses.

Agitation and lack of support

Agitation has emerged as a significant worry and perceived outcome linked with wakefulness and specifically sedation holds, one means of achieving wakefulness, for the nurses. They worry about how their patients feel during periods of agitation and, the distress it causes. They worry about the implication on their work in terms

of both its 'quantity' and quality. They worry further that the experience of agitation becomes a 'norm' in sedation holds. Compounding the 'expected' episodes of agitation they then worry that they will not receive the appropriate support in this unwanted aspect of patient care. The issues surrounding its management appeared to take two forms. Firstly, the nurses described that the ICU medical staff's lack of presence during and following a sedation hold made them feel abandoned and 'left to get on with/ left waiting for instruction'. In addition, they felt powerless in regards to initiating 'pharmacological' management to alleviate episodes of agitation. Here one nurse describes her frustrations of managing an agitated patient following a sedation holds, which was instigated by the medical staff:

" You're stuck at the end of the bed when the patient is off sedation and they're continuously a bit agitated by the fact that they are intubated and the sedation has been put off and we are just kind of expected to get on with it and continually watch the patient all day long"
(Interviewee 005)

Agitated behaviours prevent nurses from being able to attend to the other tasks, both technical and non-technical as they are preoccupied ensuring that the patient is safe and not at risk of removing essential lines or tubes, there are obvious undertones of frustration from the nurses as a consequence. Another nurse describes feelings of resentment towards the medical staff:

"...they're quite good at saying switch off sedation or no we don't want this, we don't want that, but then they walk off and they're not the ones at the end of the bed for 12.5 hours trying to do breaks...I think the nurses are quite good here, but I think sometimes how we have to do breaks, I think well you're [doctors ordering sedation holds] *making it unsafe ...but even if it's just an agitated patient, they forget that you're there for 12.5 hours..."*(Interviewee 007)

The inability to maintain a safe environment is re-emphasised, as is the nurses lack of involvement in the decision making process and the disharmony in the nurse-doctor relationship. It may suggest that the medical staff do not have enough insight into the working dynamics of a nursing shift, and that perhaps they need to be, if not empathetic, more sympathetic to these needs, especially to maintain patient safety. Similarly, this nurse too offers feelings of frustration regarding the lack of support and sympathy with agitated patients. She reflects that nurses are often left 'waiting' for medical staff and this impacts upon how they may feel about performing sedation holds:

"...if you are then waiting for somebody ...medical staff... I would just like them to be around, so you are not dealing with whatever it is [agitation and discomfort] *you are dealing with and waiting for somebody to come and say well yes, put it back on or change it to Haloperidol or whatever...."* (Interviewee 008)

The nurse's autonomy is being 'capped'. Decisions are delayed and a power struggle between the doctors and nurses emerges. The nurses are left, in their words, *"waiting"* for the doctor to come and provide support.

"... if you've got an agitated patient for 12.5 hours, it is very tiring,, and sometimes here we double up for breaks, sometimes not an appropriate double and if you've got an agitated patient and they are not adequately sedated but they [the doctors] *don't want them, you know* [re-sedated]*...it can be unsafe..."* (Interviewee 007)

The quotation indicates that on occasions the nurse has had to care for an agitated patient for a full 12.5 hour span of duty. This was cause for reflection, the researcher wondered if it was justified to have a patient agitated for such a time period, as it certainly does not sound 'optimal' or even look 'optimal'. As yet, there is limited evidence about the psychological consequences of agitated states for patients in ICU; this raises uncertainties regarding whether such states could potentially be causing patients harm. Furthermore, the potential impact on both the patient and nurse from agitation, question the rationale and patient benefit of long periods of agitation. However, an alternative view was considered following a discussion with a senior medical colleague; he said you have to ask the question "Optimal for whom?" (Personal Communication). Is it optimal for the nurse, the doctor, the patient or even the economy? Optimal may not visibly look good, as is the case with agitation, but lighter levels of sedation and sedation holds are considered consistent with the current best evidence supporting their integration into routine ICU care practices. However, if it were the medical staff who had to care for an agitated patient for 12.5 hours, would they be more empathetic to the nurses concerns and disputing 'optimal for whom?' Here one nurse describes that there is an expectation from medical staff for the nurses to manage agitated patients; that it is part of their role:

"...we are just kind of expected to get on with it and continually watch the patient all day long." (Interviewee 005)

Agitated patients require more nursing attention, in order to prevent them coming to any harm. Nurses feel undervalued, that their workload is being increased, they do not appear to have been involved in the decisions regarding their patients' sedation,

and they are 'expected' to preserve safety in an already over stretched health service. A theme of disempowerment emerges from the nurses' narratives in terms of managing sedation. In addition to 'waiting' for medical staff instructions to restart sedation during agitated period, often when medical staff are not present, the nurses also felt frustrated that they were powerless to prescribe sedation or rescue therapies for their agitated patient. One nurse vents her frustration and describes the helplessness she feels:

> *"It can also be a frustrating if there's been a medical decision to have a patient more awake... the medical decision is stop all sedation and we will see what happens and then the medical staff aren't around and there's no options for re-sedating, it's a very frustrating thing to have an agitated, uncomfortable patient who, just because the doctors decided let's wake them up, that can be really frustrating..."* (Interviewee 010)

Feelings of resentment, an unwanted phenomenon, are distressingly clear. Moreover, an interesting notion is "*stop all sedation and we will see what happens*". Firstly, sedation holds have been introduced to practice as a result of a large evidence base supporting their benefits for patients, yet this statement makes it sound far from it. This perhaps indicates that medical staff are applying sedation holds to patient groups that do not reflect the patient group the evidence based changes were intended for. This view may contribute to the nurses' unease with sedation holds as to them it implies a lax approach to care. On the other hand, it may be a revealing insight into the medical staff's feelings surrounding sedation; that they too view the outcome and subsequent management of sedation holds as an 'unknown'. Here another nurse describes his frustrations around sedative prescriptions and suggests that due to these constraints his professional autonomy is undermined:

> *"Well bearing in mind that I can't prescribe, if there is some options a prescription might allow me to have some autonomy in when and where sedation is used but not always, if the doctors come and said "stop everything"- it's then you have to do that..."* (Interviewee 010)

The nurses do not have the authority to prescribe the rescue medicines or sedatives to enable them to manage agitated patients, and perceive themselves as powerless and undervalued in the decision making process of whether to perform a sedation hold or not, yet, they have the responsibility to ensure they *are* performed and patient safety is preserved during and after it. Clearer sedation hold protocols could offer guidance and autonomy for nurses, wherein rescue plans must be clearly defined before a

patient undergoes a sedation hold. Perhaps this would allow the nurses to regain some ownership of the decisions surrounding sedation holds. Currently the ICU in which this research study was undertaken does not have a sedation hold protocol per se. There is an agitation protocol which includes guidance on the management of ICU sedation withdrawal. It directs the nurses to consult medical staff and consider use of an intravenous medication, clonidine[27]. If the patient is delirious, after consideration of precipitating factors, it suggests consideration of haloperidol (see p61). It could be argued that the protocol is encouraging medically dominated decision making?

Here two nurses reflect on how agitation is managed differently nowadays:

"...they are using things like Haloperidol more now as an intermittent kind of calming rather than putting Propofol [sedative] *up, that's quite a big change recently I think."* (Interviewee 008)

"I think now Haloperidol is what they want to use, isn't it?" (Interviewee 015)

The use of the word *"they"* indicates a lack of involvement and autonomy in the decision making process again, similar to that noted by nurses earlier. In addition, the recognition of changes in the management of agitation could also be an indicator that there is more agitation to be treated nowadays, consistent with the change to a more "wakeful" world in the ICU. Here a nurse recalls a recent experience of agitation he witnessed:

"I do think everyone in the unit has had a bad experience with patients being aggressive and not being allowed to give anything to calm the patient down and seeing as we can't restrain patients. I guess there was that one instance even last week where Staff Nurse T was punched and got concussion. I just wondered what the situation was with that, was there warning signs which I am sure there were because the patient had boxing gloves on, could more have been done to calm that patient down?" (Interviewee 003)

An interesting appreciation worth considering is the nurses initiating solutions themselves, rather than passively blaming the healthcare system for failing them in the preservation of safety at work. However, reflecting upon the literature review, individual blame in organisations is not conducive to the management or avoidance

[27] Clonidine: An α_2-agonist, which is increasingly used as a sedative in both mechanically and spontaneously breathing patients. It is particularly useful if agitation is a feature or after withdrawal of benzodiazepines or opioids. It may be administered by bolus doses or as an infusion (Medscape 2008)

of errors and adverse events occurring again as most likely the systems are at fault and changes are required (Leape 1994). Unfortunately, the issues surrounding sedation management highlight the transactional management approach that the modern NHS seems to have adopted wherein, rather than inspiring and giving the ability of workers to manage change, they assume a passive 'follower' role (Peck 2005). Notably, this transactional type of management is also the opposite of the transformational approach advocated by the SPSP to encourage and facilitate change in practice.

There is an obvious disparity emerging between the nurses in terms of what they consider appropriate management of agitation:

"...[Sometimes] *you do need to sedate a patient a little more in order to keep them safe and make sure they're not going to do themselves or their equipment any harm..."* (Interviewee 013)

Interestingly, this is the same nurse who had earlier described being a fan of sedation holds and less sedation in general, but who recognises a need to manage agitation quickly. There are obvious tensions that may be the result of uncertainty and a lack of clear guidance to assist decision making. There is evidence that the use of agents with sedative properties, especially benzodiazepines, increases the prevalence of delirium, which is a common cause of agitation (Ely et al. 2004a), but evidence to guide the management of agitation and choose the best options for individual patients is limited (Pinder & Christensen 2008). The disparity emerging in the management of agitation is not surprising considering the current evidence does not yet give a definitive answer. Nurses can be physically assaulted by patients (a critical issue in itself but not to be pursued here) as a result of agitated behaviour, further reinforcing the frustration and resentment the lack of support and autonomy they perceive. Undoubtedly, negative events such as these will impact on nurses' future practice and the decisions they may make.

Unexpectedly, the following nurse takes an opposing stance. She does not think there are more agitated patients nowadays than there used to be:

"I don't think there is, I think that was always a phenomena in ICU that you're going to have agitated patients. .. I mean it's not like that it's... massively common but you still see it, the way you used to see it, I don't think that's any different" (Interviewee 016)

Agitation clearly has a significant impact upon the care nurses provide. The management of agitation is shrouded in confusion, the nurses are not certain what they should be using to manage it or if they even have the power make any decisions regarding the management process. Furthermore, sometimes the nurses do not have *any* medication options available to them in order to ease a patient's agitated state, leaving them in a state of helplessness and subservient to the medical staff. The nurses also seem to be overlooking other factors that could be manifest as agitation such as pain, anxiety and delirium.

7.3.6.5 The emotional consequences for the nurse

Adverse events such as unplanned line and tube removals, notably sometimes a consequence of agitation itself, left them feeling that they had not fulfilled their duty as a nurse and battling with a number of personal emotions.

Guilt

The nurses' experience of guilt arose from their perception they had broken a moral standard, to keep the patient safe and free from harm of which they appear to assume significant responsibility. One nurse describes her feelings when the patient she was caring for unintentionally extubated themselves:

> *"Guilty. It makes ...you know you have done everything you can, but you're told they* [doctors] *don't want sedation up or we're trying to wake and wean them..."* (Interviewee 007)

The nurse feels like she has let the patient down by not preventing extubation, but then expresses helplessness having carried out everything she was able to, or perhaps *permitted,* to do. Descriptions of guilt following an adverse event emerged as common amongst the nurses, as this nurse describes, he felt guilty and was also left questioning whether *he* could have avoided it:

> *"I kind of feel that that happens, but often you feel like you could have avoided it by, you just take your eyes off the patient one minute and it's gone, so you do feel a bit guilty, you do feel a bit like 'it's my fault'..."* (Interviewee 005)

The nurse is searching for alternatives, things he could have changed to ensure a different outcome rather than viewing the consequence as one that is perhaps a failure of an external agency. Critical care nurses see their role as one to one care of

the seriously ill patient, one of the reasons described in an earlier chapter by the nurses for pursuing a career in ICU rather than in general hospital wards. They see intensive care as the pinnacle of their nursing care. Hence, when an unintended adverse event occurs to a patient in their care their guilt is both for the patients' wellbeing and in terms of what they see as the epitome of critical care nursing.

Failure

Closely following feelings of guilt, feelings of failure were elicited. Unsurprisingly they appeared overtly dissatisfied with their nursing care in regards to adverse events occurring. They had not maintained personal expectations and perceived they had failed in a professional sense too:

"... you 'always' feel like a complete failure and that you should have been doing this, that and the next thing." (Interviewee 008)

The researcher probed the nurse to find out who exactly she felt she was a failure to:

"...I would feel a failure personally but that's because I am used to the days when you were there all the time, you didn't turn your back on the patient, you didn't leave the patient and so that really was a failure on your part... everybody would have thought it was a failure on your part. So that still kind of sticks and there are certain aspects of nursing care that I always want to be able to, there are lots of things, talking to relatives, spending more time with the patient and what not, but we just can't do that in the same way anymore...other people would be more pragmatic about it and think well that's what happened [unplanned extubation]. *'I couldn't see them, I was in with somebody else, that's just what happens'... I would like to be like that but I still think that deep down you think well if I had only done this, if I had only done that...it is dangerous for the patient because they potentially then have to be anaesthetised... have their tube put back down maybe, or have a central line put in."* (Interviewee 008)

This experienced nurse reflects when ICU patients were heavily sedated and often being administered a paralysing agent too. In those days patients seldom moved, reducing the potential for adverse events always deemed an indication of direct failure of nursing care (Tanios, de Wit, Epstein, & Devlin 2009). Here another nurse describes when a patient in her care fell from the bed following a sedation hold. Although on a refreshment break and being observed by another nurse, she still felt responsible:

"...because you're, you're there, you're in charge of them for 12 hours, I mean whether you're there or not you have to make sure it's a safe environment for them." (Interviewee 016)

The responsibility stems from the nurse's role to care and protect their patients from harm, she was entrusted to care for the patient and harm came to them. Another nurse recalls a patient self extubating, causing distinct upset to a learner nurse and thereby another route for a sense of failure:

> *"..she* [student nurse] *was just crying... because the patient was like awake and alright getting his mouth care and then all of a sudden had to be paralysed and reintubated and she just got a bit of a shock like; the repercussions of a tube coming out"* (Interviewee 012)

Blame

Irrespective of the determination to keep their patients safe, the nurses still perceive the doctors as viewing them as having failed to fulfil their professional responsibility in regards to adverse events. That is the blame lies with nurses:

> *"... I am sure they all go and hide in a room and say that bloody stupid nurse blah, blah and this that and the next thing, I know they've said it, because they have come to me and said it to me, bitched about one of the nursing staff to me. And we do as well. ...so there is a little bit of blame culture ...on the whole I think the nurses stick together..."* (Interviewee 009)

The reporting of adverse events is imperative as part clinical governance (National Patient Safety Agency 2004b). However, it would appear that the nurses feel they are perceived to be 'stupid' or they had 'not been paying attention', even that the adverse event would not have occurred if the medical staff had attended? A lack of team working has emerged from the nurses' interviews; the doctors are perceived as not believing and/or taking the nurses claims seriously but subsequently, superimposed on their own sense of guilt and failure, blaming the nurses for the failure. It re-emphasises the professional divide that still exists between nurses and doctors in healthcare today (Coombs 2003).

The reality of fear

Unfortunately, the lack of control, support and tensions have manifested themselves as 'fear', which now appears to encircle sedation holds. The nurses were prepared to talk openly and frankly about the fear they felt performing sedation holds and the potential consequences of them. The fear of the 'unknown' posed by sedation holds and their subsequent consequences, also revealed earlier as perhaps an underlying

issue for medical staff too, emerged from the nurses' interviews. Here a nurse describes why she had a fear of sedation holds:

> *"...you're frightened of it, you don't know how the patient's going to wake, I wouldn't say frightened, that's the wrong choice of word, you're wary of it because you know you're turning sedation off. Whereas I would be more used to weaning it slower, whereas now you're on 10 of Propofol and turn it off, and you're wary of how that patient is going to wake up."* (Interviewee 016)

'Weaning' sedation by comparison appears to offer the nurses more control and confidence. Sedation holds, from the nurses perspective, have instilled fear, robbed them of confidence and are counterproductive to their professional 'world'. It is therefore unsurprising that their adoption into practice has been slow. Equally slow, as a result, has been the demise of traditional weaning of sedation; a practice in which the nurses felt in control, assured and safe. Another nurse describes fear being magnified when patients have been receiving large volumes of sedation that are then switched off:

> *"...it is difficult to know how your patient is going to react if they've been on a load of sedation and they are as flat as a pancake and then suddenly you switch it all off and you don't know how they are going to cope. If you've got someone who's on a little bit of sedation and you know rousable, tube tolerant... switching their sedation off is probably not going to be that big a deal. So knowing your patient or trying to predict what your patient is going do is quite difficult. I think that probably plays into peoples' minds when they've been asked to do sedation holds, particularly someone who has been on a lot of sedation such as* [points to patient]*."* (Interviewee 009)

It is the mere unpredictability of a patient regaining consciousness that emerges as fear quickly compounded by the nurse's fear for the patient's reactions. This fear is not compatible with assisting their patient to a smooth recovery. Interestingly, there is a greater fear of the deeply sedated patients waking, yet, this is the patient group wherein the sedation hold is most relevant. This may be because there is not continuous monitoring of sedation levels as there is for so many other physiological systems in ICU; offering warnings of changes and enabling nurses to prepare and plan.

Inexperience and fear

Interestingly, although inexperienced nurses appear to welcome a more standardised care approach in terms of checklists and protocols, it was perceived that the fear surrounding sedation holds was magnified for inexperienced nurses. One nurse

suggests from her observations that less experienced staff appear more reluctant to perform sedation holds:

> *"...I don't mind sedation holds but I know some people have a real problem with sedation holds ...I have noticed that less experienced junior staff have a problem with weaning back sedation, and especially trying to get the sedation off for extubation, they're just not confident with it at all..."* (Interviewee 012)

It would appear that it is a lack of 'experiences' among inexperienced nurses that makes them less confident in their decisions regarding their patients sedation and perhaps a lack of knowledge surrounding the benefits of sedation holds. In addition, although inexperienced nurses will ultimately endeavour to follow the guidance to perform a sedation hold, the researcher proposes that the perceived increased fear may have arisen because the guidance and support following performance of sedation holds are missing. Moreover, it appears the only possible outcomes for the nurses are feelings of guilt, failure and blame. Understandably, once these have been experienced by the inexperienced nurse they will want to avoid them manifesting again. Interestingly, the concept of sedation holds versus weaning sedation emerges again, indicating it is still very much part of sedation practice and that there is a knowledge deficit present in practice still. It could be argued that even with sound knowledge, the feelings of loss of control, confidence and autonomy have counter effects. The nurses clearly feel safer and feel their patients are safer by weaning sedation. When I probed further and asked the nurse what problems she felt the inexperienced nurses specifically had, she said:

> *"...I think that they just don't feel confident to switch the sedation off, and I think it is quite a thought, that... when you switch a patient's sedation off are they going to bounce out of bed and pull their tube out? When you are less experienced you don't know what to do with the complications of somebody self extubating themselves, I suppose it is quite difficult... if you don't know what to do when somebody extubates themselves, then you're not going to want to wean back their sedation."* (Interviewee 012)

It is perceived that feelings of fear are intensified for the nurses, if they are inexperienced. Nurses perceive the weaning of sedation as more controllable. They are in control of the sedative infusion rate and the subsequent waking effects are therefore more predictable and slow in comparison to those experienced performing sedation holds. It could be suggested that maybe the concept of 'weaning' sedation and sedation 'holds' need to meet half way, this may be able to address the

downsides of sedation holds which are problematic for its compliance. For example, it may be in the healthcare organisations and the patients benefit to introduce a sedation 'half' rather than a 'hold'; offering more control and perceived safety, to the nurses. However, the clinical benefit of this would have to be proven to satisfy the current evidence based research approach in current healthcare practices.

Pragmatism

An alternative view of sedation holds, considering the implications and emotions associated with them is pragmatism. Here nurses suggest that current changes in sedation management mean as a nurse you have to start to accept that adverse events, such as unplanned extubations, are inevitable:

"...I think ...if we are going down this way... where people are less sedated we have to accept that unless people are going to be physically restrained, which we are only kind of lightly stepping into, there are going to be episodes where people pull things out, because the nature of the staffing levels these days... you are not there all the time...you are keeping an eye on other patients, you are doubling up for breaks...I think we have to accept that these kind of things [adverse events] *are going to happen."*(Interviewee 008)

"Well you know it happens, you know it happens, sometimes you can justify, you can say I know it happens, it is unavoidable..." (Interviewee 005)

Although a notion suggested by some of the nurses, they do not seem overly comfortable with pragmatism; due to the implications for their patient's safety and clinical condition. This is particularly apparent for the experienced nurses who remember when patients were deeply sedated and paralysed; adverse events rarely occurred. In addition, such a pragmatic outlook would need the nurses to dismiss any feelings of guilt and failure they currently describe. Furthermore, pragmatism is difficult to embrace when the nurses perceive they are being blamed by the medical staff for allowing adverse events to occur in the first place; their professional ability is being called in to question. Interestingly, it is worth considering the adoption of pragmatism and the current driver of sedation holds; the SPSP. The aim is to improve patient safety and patient outcomes; it does not indicate that in the mission to achieve these targets adverse events should be happily accepted consequence. Neither does it suggest that the nurses should be happy to expect more adverse events. The patient safety programme uses Plan Do Study Act (PDSA) cycles, a model both to learn about and to facilitate change. In the case of sedation holds this is

in relation to the concern over VAP. PDSA report information about process measures; was the bundle done in practice consistently (i.e. all the elements fulfilled) and about outcome measures; has using this bundle improved practice/rates for the particular outcome. SPSP also uses 'balancing measures' to consider what other influences there might have been that have affected improvement (the bundle in this instance) being implemented e.g. unintended consequences. In this way, failed extubations are recorded by SPSP but, arguably, this does not go far enough, and perhaps it would be more meaningful to record also issues significant to ICU nursing practice, such as agitation and unplanned extubations occurring as a result of the changes made to practice. It could be argued that unless we measure events such as these we might reduce rates of VAP but unknowingly and unintentionally replaced this complication with other adverse events. It is these events which have emerged as having negative consequences and implications for the nurses' world. On the other hand, a majority of the sedation hold research does not report an excess of adverse events (Kress et al. 2000). Moreover, in some cases the patients who did self extubate during the sedation hold studies did not require to be reintubated, perhaps indicating they were ready to be extubated in any case (Girard et al. 2008).

7.3.7 Summary of chapter

The era of a more wakeful ICU population has arrived. Historically patients in ICU were deeply sedated; based on the assumption that eliminating the memory of ICU was in the patients' best interests. This definition of 'optimal' sedation has changed, and awake states are now being pursued; sedation holds are a daily consideration to aid this process. The pursuit of greater wakefulness, despite acknowledged 'outcome' benefits for ICU patients, has overlooked important implications for nurses delivering the ICU care. The interviews have revealed a disparity in the perception of 'optimal' and the purpose of sedation holds to achieve optimal sedation for patients. Sedation holds emerge as leaving the nurses in a state of disequilibrium with conflicting notions of good. There are a number of organisational constraints that the nurses have to work within, staffing levels are worsening and yet the patients' wakefulness is viewed as more demanding. There was also a strong power perception elicited from the nurses interviews; the power very much lying with the medical staff in regards to sedation management. Despite the responsibility of

sedation hold performance falling to the ICU nurses, they described having no autonomy particularly when it came to opposing a sedation hold, and decisions surrounding the management of subsequent agitation. ICU nurses will independently wean a patient's mechanical ventilation, titrate drugs that are supporting a patient's cardiovascular system and perform and order tests as they feel necessary. They are given the autonomy to make these decisions, often can pre-empt things a doctor will order or ask to be performed; saving valuable time, especially for the critically ill patient. Yet, this extended role seems to have been 'capped' when sedation holds are considered. Nurses have reservations, clinical and intuitive, regarding sedation holds but they appear to often be overlooked, or over ruled. Agitation as a result of sedation holds was a significant concern for the nurses and they perceived it to dominate their time. They also spent a lot of time feeling fearful of the potential consequences of agitation. If an adverse event was to occur they battled further emotions of guilt, failure and blame; they had failed to preserve the safety of their patient and ultimately uphold their professional standards to 'do no harm' (Nursing and Midwifery Council 2008). They felt *personally* responsible rather than viewing it as a *system* failure in healthcare, where a lack of insight into the implications of sedation holds for daily nursing practice, may be responsible. The nurses welcomed a 'plan of action' for sedation management; a more team decision approach. They propose the doctors should recognise and value their role of 'knowing' the patient and perhaps need more insight of the working nursing shift and its demands. Figure 9 summarises the nurses' feelings around current sedation hold decisions in the ICU.

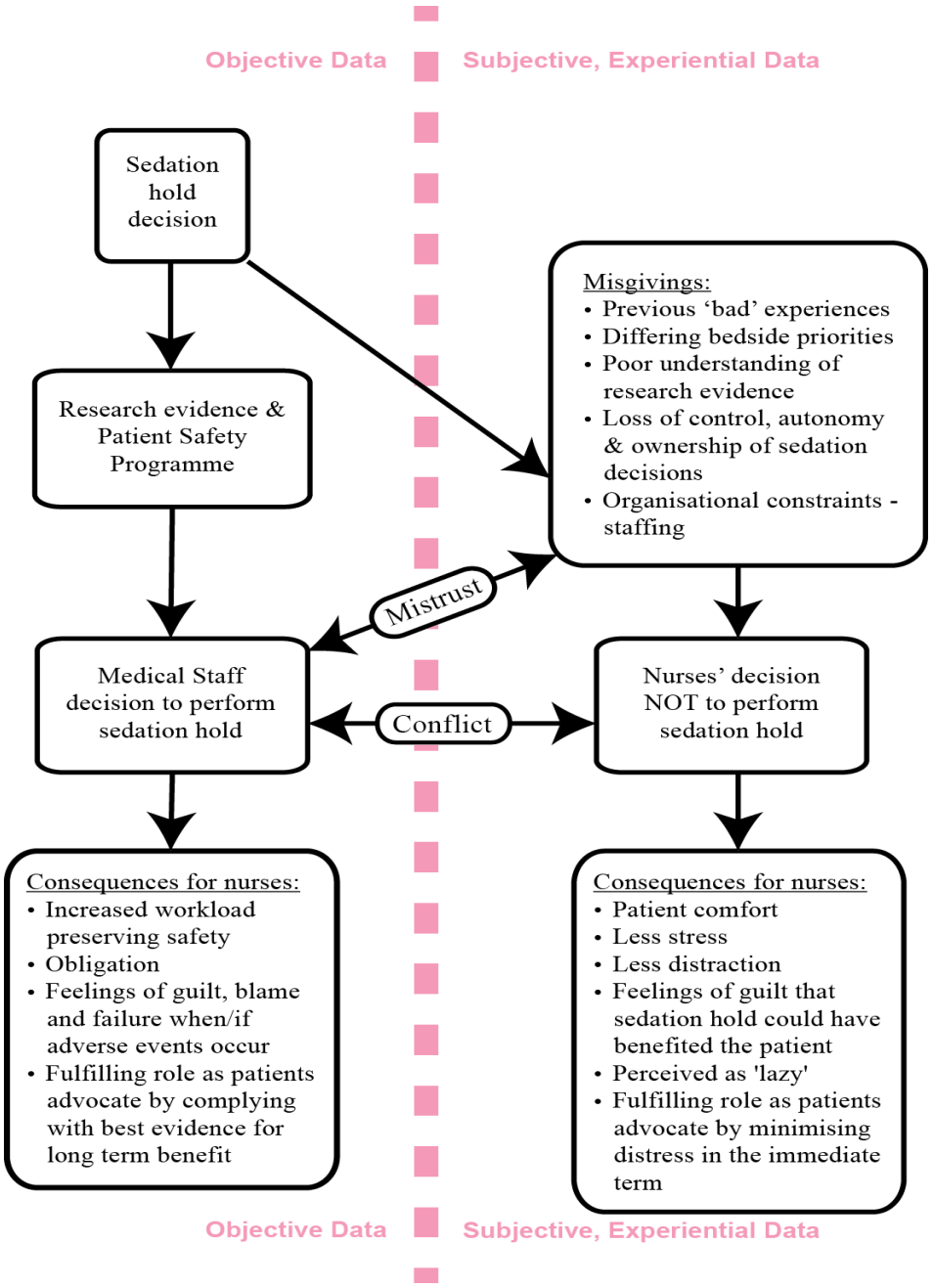


Figure 9: Summary of the issues and subsequent feelings of the ICU nurses as a result of sedation hold decisions

A nurse's experiences, personal and professional, of patient wakefulness have prolonged effects on their future decisions regarding sedation management. The nurses appear to spend a lot of time preserving patient safety as a result of changes that are driven by a patient safety programme. Interestingly, the association between

sedation holds and reduction in ventilator associated pneumonia, the programme's purpose was not recognised by the nurses interviewed. The national driver of sedation holds appears to have been completely overlooked irrespective of a large education drive to implement the programme of work.

Chapter 7.4: Responsiveness monitoring and its implications for sedation practices

7.4.1 Overview of chapter

Current research based evidence promotes a more wakeful ICU population, yet it has been difficult to assure compliance with this. The interviews elicited a number of potential implications for the assessment and management of patients' sedation in pursuit of a more wakeful ICU population. The nurses describe the unrest in their 'worlds', balancing organisational pressures whilst trying to maintain a safe environment for their patients. Feelings of loss of control, autonomy and fear in their professional role were apparent. Currently the use of sedation scoring systems and protocols are deemed best practice to assess and guide the management of a patient's sedation. However, as described in the literature review and unveiled in the previous chapter, sedation scoring tools are often subjectively interpreted. In addition, such assessment tools are failing to offer the nurses any confidence in their sedation management decisions, or any forewarning that their patient may be waking up. This is due to the potentially fluctuating nature of patients' sedation status and that the sedation scales only offer the nurses a crude score at the precise moment they perform the assessment. A possible solution to these issues could be offered by the responsiveness monitor; developed as an objective system with a continuous trend indicating how responsive a patient is. The lack of user involvement in the development of technology is noted (McConnell 1990). This oversight has

implications for the technologies effective and correct use in practice (Curtin 1990;McConnell 1990); highlighting the importance of the nurses' insights and opinions of the responsiveness monitor. Heidegger would argue that these types of technological advancements are turning medicine towards "technocentricity" (Brassington 2007 p188) which concurs with the ongoing debate around healthcare technologies being dehumanising. This is despite medicine and, in this case, the responsiveness monitor, explicitly looking to improve patient care and patient experience. However, Heidegger maintains the view that technology is a danger to our 'being'. These practicalities will be considered alongside the nurses perceptions of the responsiveness monitor. The nurses considered the sedation monitor and its influence on, and implications for, their nursing practice and decisions; all the nurses

interviewed had a minimum of twelve hours responsiveness monitor experience. It emerged that the concept of a sedation monitor was a welcomed addition to their current nursing practice. It appeared that the responsiveness monitor may alleviate some of the fear of the 'unknown' associated with a more wakeful ICU population, offering the nurses confidence and encouraging their professional autonomy.

7.4.2 Relooking at the concept of the responsiveness monitor

Chapter 4 presented the concept of the responsiveness monitor and Appendix 10 contains illustrations of the monitor's interface and its application on patients. Using facial muscle activity, it generates numbers 0-100, grouped into corresponding traffic light colours; red (0-20), yellow (21-40) and green (41-100). These numbers and colours are used to distinguish between whether a patient is unresponsive (potentially over sedated), red or responsive, green (alert). It has no audible alarm; the colours alone are the proposed alert. With occasional exceptions, red generally indicates a patient is over sedated. If a patient is encephalopathic[28] or falls asleep, they too would enter the red zone on the monitoring system, even if receiving no or minimal sedation at the time. Green indicates that the patient is in a more optimally sedated state or wakeful state but, it must be acknowledged, could also indicate agitation. In addition, as the concept works on forehead muscle activity, if the patient was rigoring[29], they potentially may appear to be in the green zone but could still be deeply sedated. These caveats were highlighted in the education package supplied alongside the practical responsiveness monitor training provided to the ICU nursing staff. At present there is no similar objective monitoring available to assist nurses or

[28] Encephalopathic: Encephalopathy is a term for any diffuse disease of the brain that alters brain function or structure. Encephalopathy may be caused by infectious agent, metabolic or mitochondrial dysfunction, brain tumour or increased pressure in the skull, prolonged exposure to toxic elements (including solvents, drugs, radiation, paints, industrial chemicals, and certain metals), chronic progressive trauma, poor nutrition, or lack of oxygen or blood flow to the brain. The hallmark of encephalopathy is an altered mental state. Depending on the type and severity of encephalopathy, common neurological symptoms are progressive loss of memory and cognitive ability, subtle personality changes, inability to concentrate, lethargy, and progressive loss of consciousness (Adapted from (National Institute of Health 2010)

[29] Rigoring: Sudden chill, accompanied by severe shivering. The body temperature rises rapidly and remains high until perspiration ensues and causes a gradual fall in temperature (Royal College of Nursing 1996)

doctors in knowing how deeply sedated their patients are and current practice is to use a sedation scale to determine this.

7.4.3 Design and practical considerations

As emphasised in the review of the technology literature, it is important to consider the more practical issues of a new piece of technology. The literature review highlighted that the lack of frontline user involvement in the development of technologies was deemed detrimental to its success (McConnell 1990). Furthermore, from a Heideggerian perspective it would be argued that the responsiveness monitor could only be viewed, and develop its 'responsiveness monitor-ness', by those who use it, not by those who made the monitor itself (Brassington 2007). Unsurprisingly then, it emerged that practical issues regarding the responsiveness monitor influenced the acceptance and usability of the responsiveness monitor in the nurses' 'world'. This is important, as potentially the nurses will be the main users of the monitoring should it be commercially marketed in the future.

7.4.3.1 Non-invasive interventions

The nurses felt the monitor was easy to set up, they said:

"...I don't mind them, they are unobtrusive... easy to set up, just stick the sensors on, plug the machine in, away you go..." (Interviewee 009)

"...its three stickers on their [the patient's] *forehead, I don't think it's hurting him. I think if it was invasive I would have maybe a bit more reserve about it..."* (Interviewee 004)

The non-invasive nature of the monitoring was received positively by the nurses. This fits well with the new healthcare culture 'less is more' discussed earlier wherein, if possible, non-invasive therapies are being advocated for patients (Festic & Gajic 2009).

7.4.3.2 'Trend' familiarity and the responsiveness monitor

The trends and numbers the responsiveness monitor interface displayed were comparable with those already used on other monitors in the ICU. This familiarity appeared to make the responsiveness monitor easily accepted, the nurses describing being able to quickly glance at and interpret the responsiveness monitor's data:

"I think in intensive care we are used to having waveforms so I really like that but I think the thing I find most useful is the colour coding so that you can automatically, just from glancing at it, you can...have knowledge from...the colour the number is in....it seems quite user friendly... it is very similar to the waveforms we already have on the monitors... the waveform with a number at the end....it is nice and simple, it is not over complicated" (Interviewee 001)

This is noteworthy, especially reflecting on the earlier discussions in the technology chapter debating that monitors purely display data and this data only becomes information if it is understood and interpreted correctly by the user in charge of it (Cruz & Franklin 2001). In contrast, some concerns were raised that this additional data could be lost amongst all the other 'numbers' and colours already commonplace in ICU:

"...it would be quite nice to have a different coloured number...it would draw your attention more and people might not get confused. Like if you had a green number at the corner of your screen saying 100 or 90, somebody might misinterpret that as like a heart rate thing..." (Interviewee 012)

7.4.3.3 Traffic lights and decision making

The colours used on the interface of the responsiveness monitors were frequently identified as the most useful aspect; the nurses used the colours to illustrate their decision making:

"...red is like danger (laughs) I feel like I'm putting my patient in peril (laughs) or something.....and I suppose green is like harmony (laughs), I am not sure what the yellow is.....I'm like 'oh my word it's red, I should really double check this'." (Interviewee 004)

"... it is very helpful because ... if the patient is lying in the red zone for no apparent reason...then it kind of concentrates your care that something has to be done..." (Interviewee 002)

"...I think you have this visual reminder and it's a bit more obvious to not just you but everybody passing by, so you think oh they're in a red zone, you would probably have to try and reduce that down" (Interviewee 014)

The 'traffic light' colours were easy for the nurses to identify with as colours they encounter on a daily basis, for instance traffic lights and food labelling. When I probed the nurses about what they specifically liked about the colours, it appeared that many associated red with 'danger' and a 'zone' they did not want their patients to be in unnecessarily. Initially, the perception that the red zone was a 'danger zone' caused unease; specifically the red zone was being viewed as an 'emergency'. For

instance, many alarms on the main ICU monitors currently used turn red to indicate emergencies. If a patient develops asystole, the heart rate trend number displayed will turn red, flash and the monitor will alarm at a different pitch. However, in terms of the responsiveness monitor, it was elicited from the nurses that the red zone was more an 'alert', a prompt, which meant they needed to consider their patients current sedation status. Notably the nurses did seem to focus on the red zone of the responsiveness monitoring, this may be a fault of the education package delivered which inferred that the aim was, where possible, to have patients out of the red zone.

7.4.3.4 Alert not alarm

The absence of an audible alarm, contrary to many ICU technologies which often have loud, high pitched audible alarms (Sanderson 2009) seemed unnoticed by some of the nurses. Interestingly, following consideration of the colour red as an 'emergency' many of the nurses were struck by the fact they could not remember, nor had not noticed, if the responsiveness monitor had an alarm. More so, when probed further about whether the monitor needed an alarm, the researcher was often met with a long pause. Many of the nurses seemed to struggle to decide whether it needed one or not. One nurse felt that an alarm on the responsiveness monitor might be ignored. When I probed why, she said

"I don't know. I think people think that the sedation thing isn't a priority..." (Interviewee 012)

The researcher was surprised by this response. Sedation is receiving considerable attention in ICU nursing practice currently and it was the focus of exploration of the interview. The researcher reflects that the nurse's response suggests a frank honesty in her answer and reassures validity of the research subject interaction. The implications of interactions with interviewees was discussed in Chapter 6, wherein the relationship between the researcher and interviewee can influence the data gathered. When I probed the nurse if she could explain her feelings, she said:

"It's quite weird because sedation...when somebody is admitted it's like 'Propofol and Alfentanil' and sedation is one of the biggest priorities but then, how sedated your patient is I don't think is a priority but as long as your patient is sedated." (Interviewee 012)

There is a suggestion that when patients are first admitted to ICU, the priority is to 'get the patient sedated', to allow the multiple interventions often required. This is

nicely illustrated through the description *"it's like 'Propofol and Alfentanil'";* indicating that there may not be much thought required, it is a routine 'cocktail' of sedatives and analgesics given to admissions. The level of sedation seems unimportant, as long as the patient *is* sedated. This is interesting to note particularly as over sedation has the potential to occur during the more acute periods after admission to ICU due to the therapies and interventions a patient may be necessarily subjected to. Another interesting notion described was that she felt the responsiveness monitor would be more useful, when a patient is being weaned from ventilation. This resonates with the discussion in the previous chapter about the purpose of reducing sedation and sedation holds when the nurses inextricably linked weaning of ventilation, including extubation, with sedation reductions and holds.

A number of nurses felt that if the monitor's electrodes (see Appendix 10) disconnected, an alarm would have been beneficial, but otherwise they were happy for it not to have one. The nurses seemed to perceive the monitor as an 'alert' rather than an 'alarm'; this justifies the lack of audible alarm. It is a prompt to make them think about their patient's sedation management, the colour 'red' alone caught their attention and made them 'stop and think'; the use of the colour red did not cause them to panic. Moreover, the literature review noted that alarms often lose their alarming-ness when they deliver false positives to users (Görges, Markewitz, & Westenskow 2009), whereas an alert presumes heightened awareness. However, and perhaps worryingly, reflecting upon the earlier nurses' comment, perhaps they did not 'panic' because they failed to recognise sedation as important in comparison to other physiological signs being monitored? Although arguably, responding to deepened sedation levels does not require the same urgency or immediate action as response to a ventilator disconnection or cardiac arrhythmia as it is not life threatening, unlike the latter.

7.4.3.5 Trust in technologies

As this was a new piece of ICU technology, the nurses would undoubtedly have been testing the technology from a 'trust' perspective too. Trust with technologies builds over time as nurses become more familiar it develops as described in the literature review (Wilkinson 1992). In addition, an important element of trust relates to face

validity. As already explored earlier, there were occasions when the nurses did not *believe* the responsiveness monitor and hence did not reduce their sedation in line with its suggestion, instead using their clinical judgement. The issue is illustrated by this nurse, who took a more 'suspicious' view of the responsiveness monitor's information:

"...I do think when I see it, and when I look at it and I look at the trends, I do think 'Do I believe it?' each time...If I am doing a assessment...I think some of the time it does work but I don't think it works all the time. Sometimes there is that odd occasion I've thought it's just bizarre...I try to trust myself more" (Interviewee 005)

Another nurse suggested that she was aware that the patient's clinical condition and the responsiveness monitor and colour did not always marry-up:

"...I have noticed that it is not always the same [the patient and the monitor], *it's not as accurate on every patient, but apart from that I think it is a good indicator and especially with all the colouring as well of how awake they are, red you should be reducing it a bit, and obviously if they are green all the time fantastic if they're* [the patient] *not bothered"* (Interviewee 006)

Unfortunately, the population of ICU nurses (~100) and the final number of patients recruited to the randomised control trial (n=74), made it impossible for the researcher to train all the nurses (only 65 nurses were trained). Moreover, the monitors were only used in practice for eight months and patients only had responsiveness monitoring attached for a maximum of forty-eight hours. All of these factors made it impossible for the researcher to provide monitor training for all the nurses. All these factors considered, meant that many nurses did not use the monitor regularly enough for them to build trust and familiarity. The potential conflict of the researcher's roles in this context was illustrated in Chapter 6. This could have potentially contributed to feelings of mistrust elicited as illustrated by these nurses:

"...I would like to try it in different situations with different types of sedation, different amounts of sedation and see how things went from there..." (Interviewee 010)

"I can't say that I was using the information from the monitor, I was using my RASS score, my GCS, more so because I'm more familiar and probably felt it was more reliable." (Interviewee 016)

"...I have had the training on it but...it's not like I know everything about everything...the frontal muscles, I don't know how...efficient that is as a form of reporting about how you know sedation..." (Interviewee 007)

The familiar modes of sedation assessment, RASS and GCS, were more trusted and appeared to have more credibility. Interestingly, GCS is referred to again. As already discussed, GCS is not seen as an accurate measurement of sedation status in ICU patients (Price, Miller and deScossa 2000). Trust in technologies, as shown in McConnell's (1990) work, is integral to its successful use in practice, *although* it was also claimed that nurses would *never* fully trust *any* technologies. However, the curiosity regarding the responsiveness monitor amongst the nurses was clearly evident. The researcher vividly remembers many of the ICU nurses actively requesting to receive responsiveness monitor training; a prerequisite of being able to use the monitor. They were indeed keen to use the monitor in *their* practice.

7.4.3.6 The criticisms

There were features of the responsiveness monitor that the nurses felt would not work well in practice or would at least need adaption. The small thirty minute 'snapshot' of EMG was not used by the nurses (see Appendix 10). The nurses never referred to it, unless prompted, could not remember its purpose, despite the training sessions, and admitted it did not serve to guide their sedation decisions:

"To be honest, I don't really look at that." (Interviewee 006)

"I didn't use that one so much" (Interviewee 013)

The nurses also commented on a delay in the responsiveness monitor relative to the patient's actual status which was disconcerting. This was not assisted by the fact that the red zone and the green zone could be interpreted differently in specific clinical states. The nurses described this imprecision as potentially misleading generating further uncertainty in their 'world'. Optimistically they felt that further education and training would overcome these problems rather than modification of the monitor.

7.4.4 The clinical use of responsiveness

In addition to considering the practical design of the responsiveness monitor, the implications of its use in practice must be explored, particularly in view of the potent issues and emotions revealed about sedation practices in the previous chapter. .

7.4.4.1 Dispelling subjectivity

The responsiveness monitor was clearly seen as an adjunct to the sedation assessments using the RASS score. RASS scores are a daily, often hourly, recording made by the ICU nurses but the nurses described this assessment as a challenging and often subjective process, varying between nurses and between patients. Furthermore, the nurses describe the 'active' requirement to perform a sedation assessment to inform their decisions almost as an inconvenience; essentially delaying the decision making processes:

"I think it probably prompted you to think about it [sedation] *more because you can also write an hourly RASS without much thought, so for me it probably prompted me to think 'yes well actually she is a –3', or whatever maybe I should be turning* [sedation down]*... it is a prompt..."* (Interviewee 008)

"I think it is much more of a reminder...you know you don't necessarily do your RASS every single hour of your observations, yet I look at the monitor, I have been seeing the trace on the monitor a lot more than I would actually have done the RASS" (Interviewee 001)

Such comments reflect appreciation of the continuous data the monitor provided, a continuous supply of information that did not require the nurses to stop and discretely collect. The information the monitor provided appeared less influenced by environmental factors or qualities in the individual nurse and arguably more importantly, the information was objective:

"I think it will help everybody ...I think that, maybe when you're more experienced you get complacent about things like that [sedation assessment] *and you think that your patient is less or more sedated than it really is"* (Interviewee 012)

This continuous objective trend could be quickly ascertained 'at a glance' and seen as potentially more effective than the intermittent assessment scores of RASS which the nurses argued could readily become automated and unthinking. This allowed, as one nurse suggested, 'complacency' to breed. Complacency is an interesting notion as it indicates an inattentive but often over confident approach, not ideal in providing patient care. Another nurse observes:

"I like to be checked that what I am doing has a reason, so I've got to justify what I'm saying and I don't mind disagreeing with what the monitor is saying ...but it's quite good to give rationale. Sometimes you do all these things subconsciously...you do it all in your head and it's just kind of second nature?.....Whereas with this it makes you write it all out, and really think about it, you have to make ...an argument for why you are doing that..."
(Interviewee 004)

The nurse is referring to the logs completed whilst using the monitor (see Appendix 4). Each nurse documented the assessed RASS score and the corresponding monitor colour and number giving a simple explanation as to why, and if, they disagreed with the monitoring. It has been asserted that with increasing experience, knowledge and expertise, nurses demonstrate a more intuitive reasoning, the logical rational analysis, although undertaken, becoming subliminal (Benner & Tanner 1987a). Although completion of the log was a more time consuming process, it had proven a useful reflective exercise. As such the responsiveness monitor served potentially to change or modify the nurses' decision making processes not merely confirming their established thinking. This same nurse viewed the monitor as a challenge to her current clinical decisions and judgements:

"I think it's a wee bit of a challenge, I like a wee challenge...every day I want to check that what I have been thinking is correct and I check with the monitor whether it's the same"
(Interviewee 004)

The inference from this comment might be that the nurse has seen it as a challenge to her subjective assessments, drawn from her clinical experiences and the influences and constraints within the ICU. Equally the responsiveness monitor could potentially help overcome the issue of professional conflict that emerged through the nurses' interviews, the responsiveness monitor providing objective 'evidence' as to patients' sedation status and might assist in dissipating the nurses' feelings of resentment, frustrations and inter- professional power struggles identified. From Heidegger's perspective however, such objectivity, would undoubtedly be viewed as an unachievable claim. He asserted that technology can never be a neutral object; it is manipulated in such a manner by humans as to ensure that we control and ultimately master it, in such a way that it is useful for our 'being' (King 2001).

7.4.4.2 Guidance during the 'invisible' times

Sedation status can fluctuate and sedation assessments only deliver information on a patient's sedation status at a precise discrete moment. The usefulness of the responsiveness monitor is that it offers a continuous assessment. The nurses complained the medical team tended only to see their patients lying still in the bed devoid of signs of agitation leaving the nurses constantly to justify and defend the reality of their patient's changeable sedation status to those whose intermittent

presence did not reflect the true picture. One nurse suggests the possibility of using the continuous assessment data from the responsiveness monitor as a means of reflecting a patient's sedation reality to all and would thereby allow for shared sedation goals. In itself this is not a new concept but rather can be seen to align other physiological parameters such as heart rate and blood pressure and the shared goals and decisions in terms of appropriate medication. Moreover, by offering clearer evidence, intervention and sedation targets are based on data rather than obligation, and are team based rather than power based:

> *"...*[it will allow the doctors to] *give the nurses a more specific range to, instead of just 'wean back that sedation please', they will say can we have this patient in the green zone which will be easier for them because then they won't have to shout at us and say why haven't you weaned back that sedation"* (Interviewee 012)

As noted already, the nurses spend more time with the patients in ICU than any other healthcare member and therefore must have insights denied those who may only momentarily assess a patient. However, in considering Heidegger's perspective and this privileged position the nurses have, one must be obliged to explore whether nurses are at risk of becoming slaves to the technology itself; mastered by the technology that absorbs their working day (Brassington 2007). Furthermore, despite the nurses suggesting the monitor would aid shared decision making, the nurse above describes the medical staff using the monitor to "give" nurses a specific sedation range to achieve. Surely there is a risk that if the monitor is used in this manner it will only perpetuate and reinforce the power relations the nurses vent frustration and resentment about? Yet, interestingly it was the nurses that suggested that targets should be set on the responsiveness monitor. This perhaps could indicate an unconscious acceptance of subservient behaviour and the need to be given orders, *or* that sedation practices will always be governed by medics and that they already perceive the monitor will be 'ruled' by medical staff. It may also be an indication of the role the nurses have already assumed around sedation practice and the lack of ownership they recall feeling surrounding it.

The responsiveness monitor displays a continuous sedation trend over eight hours, a useful tool to support and uphold the nurses' clinical decision making, particularly so for less experienced, arguably less assertive nursing staff:

"...well there you are there's your proof that if you were somebody less experienced...you could say look even on this sedation they've been fairly restless....." (Interviewee 008)

The responsiveness monitor can act as the nurses' objective 'ally' 'physically' illustrating a patient's 'wakefulness' the nurses have witnessed and experienced, and dispelling any 'easy life' notion doctors might have suggested.

Furthermore, the monitor appears to support the nurses' need to 'know' their patient expressed in the previous chapter. Often, a nurse is required rapidly to 'get up to speed' with their patient, especially so with a new patient:

"It's helpful as a nurse when you come on, sometimes it takes time to see where you are and that [the responsiveness monitor] *will give you quite a quick overview"* (Interviewee 004)

The continuous trend displayed by the monitor gives an immediate overview of the patient's sedation status for the previous eight hours, which is available to any staff member. Here although caution may be needed to ensure that it does not become a tool to dictate ranges and targets, it can be argued that far from being enslaved by the responsiveness monitor as suggested by Heidegger (1954), the monitor is to develop and enhance their patient 'knowing' to provide individualised nursing care.

7.4.4.3 A solution to the unpredictable response

Bearing in mind the overwhelming feelings of 'unknown' and fear that was elicited from the nurses regarding the sedation status of patients, specifically sedation holds, the nurses greeted the responsiveness monitor and the information it provided with approval and of benefit to their 'world' and the ICU 'world' in general. Indeed the responsiveness monitor was welcomed as a means to prepare the nurses for patient wakening:

"I just think that people waking up is one of the hardest, one of the hardest things we have to witness here, because people are uncomfortable, they get a fright, you know it is quite nerve racking sometimes because you don't know what is going to happen and I think anything that is preparing you more to be prepared for things is good" (Interviewee 004)

Preparation and 'advanced notice' that a patient is wakening enables the nurse to be more in control, plan and organise their time. A state of 'prepared-ness' may also offer better patient and staff safety, something which the nurses earlier described as being jeopardised by the changes to sedation practice and a more wakeful ICU population. Here an inexperienced nurse, only three months ICU nursing experience,

identifies the responsiveness monitor as boosting his confidence in assessing sedation:

"I am still doing the RASS every time and then checking myself with the number as well, so it is helping me, it is giving me confidence in the decisions that I am making" (Interviewee 001)

Bearing in mind that sedation assessments may still have been relatively new skill for this inexperienced critical care nurse, he would, as Benner (1984) argues, have been approaching this in a more structured manner, as opposed to the more intuitive manner of the expert nurse. Equally, a more experienced nurse reflecting on the monitor, states:

"It's a guide...it gives you a bit more confidence in what you're doing in terms of lightening the patient or maybe giving them more sedation, it help you decide what to do I think…It confirmed what I was thinking so I felt more comfortable then in reducing it a bit" (Interviewee 005)

Having talked openly about the fear and unease they felt surrounding sedation holds, here they welcomed the responsiveness monitor as a means of dispelling such fears and countering the feared unpredictability. The notion of technologies giving reassurance was also reported by the nurses interviewed by McConnell (1990), who described the technologies as providing detailed information before visual clinical changes were manifest, improving decisions and ultimately patient safety.

7.4.4.4 Increased awareness; an alert

The ultimate aim of the responsiveness monitor is, of course, to improve patient care by potentially avoiding patients being unnecessarily kept at deep sedation levels but more importantly, and perhaps not anticipated as an outcome, the nurses' reflections clearly demonstrate that the responsiveness monitor made them think more discerningly about their sedation practice:

"...it just spurs you on to think about the patient's sedation level a bit more, whether they are appropriately sedated" (Interviewee 005)

"I think it is much more of a reminder...I have been seeing the trace on the monitor a lot more than I would actually have done the RASS" (Interviewee 001)

"...I think it would be a useful monitor to have at the bed side...just to make you think about how much sedation you are actually giving the patient and whether they need that much or not" (Interviewee 009)

The monitor is therefore seen to influence the nurse's clinical decision making such that more active changes are made to their patient's sedation management. Although the monitor had no audible alarm, a glance, according to the nurses, could help determine a patient's sedation status:

"*Sometimes you can be so busy...that in as much as you would be looking just in a split second, as you can see, 28 and it will amaze you that within 5 minutes it has dropped into the red zone, so I think if you were very busy...if there was something just to alert you...*" (Interviewee 002)

The monitor arguably could be seen as assisting and adding value to nursing care in a time where staffing levels are in a decline, as a non-intrusive but continuous prompt. Although equally this could be argued as 'dehumanising' patient care, a fear about technology already acknowledged by many (Calne 1994;Dean 1998;Little 2000;Mackellaig 2009;Walters 1995;Wilkinson 1992), the nurses did not view it this way. Yet, this must depend upon how the responsiveness monitor is adopted and used in clinical practice? The nurses' responses retain the personal and patient centred value. Another nurse suggests that just being able to see the colour and number on the responsiveness monitor's screen automatically triggers her to consider her patients sedation status and overall well-being:

"When I see it red and a low number, it does make me question what is the patient's sedation, how awake are they, what's their GCS, what's their RASS score, it just makes me check over everything." (Interviewee 003)

Interestingly, the nurses are alerted to the monitor even though it does not have an inbuilt alarm. Most technologies in ICU have an alarm; it is a world of 'alarms'. However, the evidence suggests there are too many alarms for human beings to correctly recognise them all (Sanderson 2009), suggesting, arguably, that it is not problematic that the responsiveness monitor does not have an alarm. Here a nurse described how the responsiveness monitor heightened his awareness of the impact of interventions on their patient's conscious level:

"It's good because you can see, particularly if they're kind of in the red or yellow zone, and you intervene and do something, suction or turn them or whatever and you can see how that affects their conscious level... hopefully it will raise their conscious level and they may wake up and go into the green zone for a few minutes. Interesting from that point of view, to see what your nursing intervention is actually doing to their conscious level of the patient even though you can't see it physically in the patient...." (Interviewee 009)

A bolus of sedation quickly equates to a change on the responsiveness monitor. The responsiveness monitor was making the usually 'invisible' underlying sedation 'visible'. This prompted the researcher to probe the nurses and explore as to whether they felt the monitor had led to a reduction in the amount of sedation they administered:

"...yes I think so in certain cases...when there has been no red zone for 3, 4 or 5 hours then they don't need to be on as much sedation, providing...they're not writhing around in the bed, which I guess they shouldn't be if they're 'red lining' [in the red, deeply sedated, zone on the responsiveness monitor screen]*...in cases like that I would have...reduced their sedation a little bit just to see if it altered what the monitored reading said more than anything else really"* (Interviewee 009)

""...I guess maybe the monitor might be making me do things quicker, might be making me think earlier in the shift or the hour about the sedation...lightening sedation quicker, on your shifts, making you more aware of your patients level of sedation, rather than waiting for hourly obs [vital signs]*... it* [sedation monitor] *is always there, it always produces a number..."* (Interviewee 003)

"I think I have reduced sedation...to see if a patient wakes up or not. I have tried it...just looking at the colours and numbers..." (Interviewee 011)

"... I mean it has helped, yes definitely...Your patient could be RASS-3 and...be...in the red zone so you know...you'd want to wean off your sedation more than when your patient's RASS was -3 [this had been the only information re sedation available], *so if there's a monitor telling you...'go and hurry up and do it', then that would be a positive thing..."* (Interviewee 012)

In contrast, some nurses' did not perceive the monitor to have instigated their decreasing the patients' sedation delivered, due to limitations of the monitor identified earlier:

"No...because I found it difficult to assess whether my patient was over sedated or asleep. I didn't really feel that it gave me anymore information than I could have acquired by looking at a patient and asking them to respond to me..." (Interviewee 013)

"I have to be honest and this is perhaps not a reflection of the monitor, it's more a reflection of me...I still kind of did it more clinically, looking at the patient, if they were comfortable or uncomfortable. I mean when it's in red it's good, it does trigger your thinking, if they're over sedated, I suppose it did make me think a bit more about that but if I remember...there was some quite big fluctuations so when it was showing red that would indicate they were over sedated but actually in my opinion they weren't because they were easily woken up again with minimal intervention..." (Interviewee 010)

This nurse also chose to stick with familiar clinical assessments:

"No. I suppose I kind of went by my patient really...because the thing didn't correlate, the monitor didn't correlate all the time with the patient...I suppose I went more by my...RASS score...I suppose I am guilty of just recording what the monitor was saying for the study but I

can't say I was using the information from the monitor, I was using my RASS score, my GCS, more so because I'm more familiar and probably felt it was more reliable..."
(Interviewee 015)

Nurses are, indeed, reported as being ambivalent as to the benefits of technologies (Wichowski 1994). Heidegger feared that technologies will enslave its users; "man being mastered by technology" (Brassington 2007 p190). However, *all* the nurses interviewed appear still to be relying on their 'being-in-the-world', to inform their choices and not bowing to the power of technology. The nurses, irrespective of experience and expertise, are positive about the implications the monitor may have for their practice but more in terms of raising their awareness of their sedation practices and decisions rather than it markedly affecting the sedation administered. Interestingly, data collected separately from this study indicated the opposite, that in fact patients managed with a responsiveness monitor spent less time in the deeply unresponsive states and hence less sedation administered (see Appendix 1). Furthermore, as acknowledged earlier the nurses' use of the monitor was limited. This inarguably affected the nurses' perceptions and adoption of the monitor for their practice. The issues surrounding the acceptance and adoption of technologies in nursing practice were revealed by the nurses in Chapter 7.2. The nurses described the training and education surrounding new technologies as crucial to its use, but in reality they were often left to 'learn on the job' due to time and staffing constraints. The nurses felt they had to grasp the workings of new technologies quickly for their patients' sake but recognised that unfamiliarity of technologies bred distrust and sometimes left them feeling 'uncomfortable' in their 'world'. This concurs with the literature, that technology was perceived as being designed for the 'market' with little appreciation or insight of its use and implications in 'real' clinical practice (Leslie 2006;McConnell 1990).

Some additional serendipitous observations were made by the researcher. The nurses were observed developing their own additional 'alert' in terms of 'competiveness'. Nurses were observed remarking to their nursing colleagues using monitors, "Oh... Nurse X in bed space 12 has their patient in the green zone and yours is in the red zone..." This occurred without any encouragement from the researcher but on reflection perhaps added to the value of the responsiveness monitor. It became

apparent that patients sedation levels could not be hidden nor ignored: they were visible to all. The notion of sedation not being a 'hidden' variable with the responsiveness monitor emerged from this nurse's narrative:

"...it's maybe a bit more obvious to not just you but everybody passing by, so you think oh they're in a red zone, you would probably have to try and reduce that down...a warning in your face...it's less easier to ignore it..." (Interviewee 014)

7.4.5 Summary of chapter

The overall use of sedation in ICU is felt to be decreasing and wakefulness is being viewed more as the norm. However, there are apparent challenges in the implementation and maintenance of these changes in clinical practice, particularly implementing sedation holds, illustrated by the poor compliance (Dotson 2010;Mehta et al. 2006;Patel et al. 2009;Tanios et al. 2009). From the perceptions revealed by the nurses, regardless of experience and expertise, the responsiveness monitor would appear to offer a way of addressing these challenges and the potent emotions of fear, loss of control and confidence experienced in the ICU nurses' 'world'. The potential effect of the responsiveness monitor on sedation hold decision making has been summarised in Figure 10 below. However, caution may need to be exercised in the way in which it is used. If the monitor is used to 'dictate' ranges of responsiveness or achieve specific targets, especially if driven by medical staff, the value of the monitor's information may shift from a tool to assist decision-making to another potential source of conflict. If used in this way it will surely only reflect the way in which sedation practice and sedation holds particularly are perceived by the nurses as being currently 'ruled'. This will potentially only result in the negative cycles revealed surrounding sedation practice continuing. Furthermore, a dilemma exists in that whilst simultaneously increasing awareness of sedation status in a non-invasive manner the responsiveness monitor is yet another ICU technology to divert the nurse's focus to another machine rather than to the patient connected to it (Polkinghorne 2004). Despite Heidegger suggesting the essence of technology presented 'danger' and that it had the potential to overshadow Beings position in the world, this was not overtly articulated by the nurses.

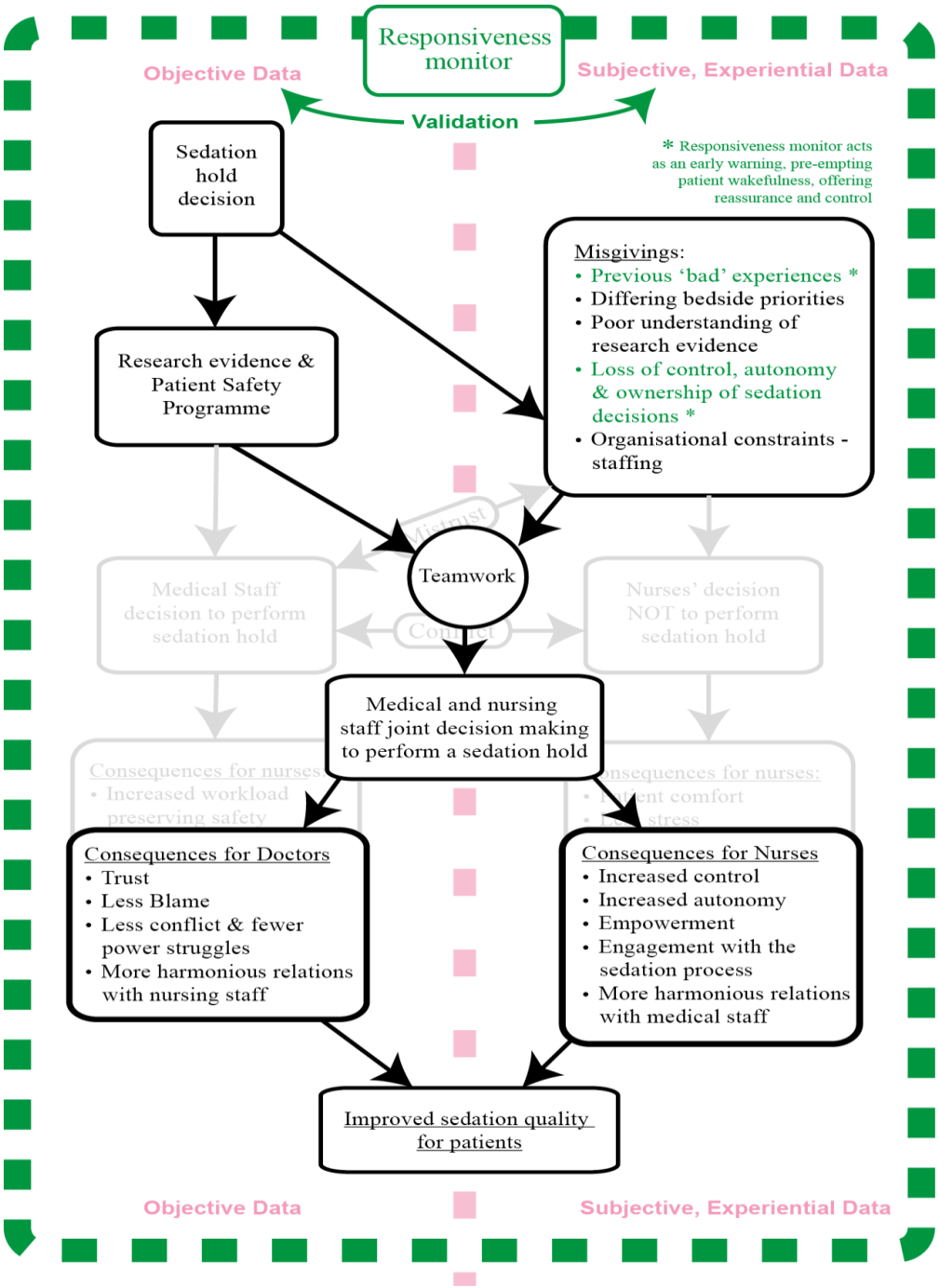


Figure 10: Summary of the potential effect of the responsiveness monitor on sedation hold decision making. The green dashed line is the responsiveness monitor indicating that it encapsulates the current decision making around sedation holds. It potentially could help validate the subjective and experiential data the nurses revealed as strongly influencing their decision making and could act as an early warning for patient wakening. More importantly it encourages team work and communication between the doctors and nurses; joint decision making.

Advancing technologies are part of the world we live in and to deny this would arguably be "disempowering medicine's ability to heal?" (Brassington 2007 p190). Although the use of this monitor was limited the nurses recalled its use in a mainly favourable manner. They appeared to view it as an adjunct to the care they provide and were undaunted by 'getting to grips' with another piece of technology. They described it as not infallible but as having a relevant and applicable place in *their* daily nursing care, acknowledging the current concerns with sedation practice. However, as with currently used ICU technologies, the key to its effective use would be adequate training and education. Indeed there were disconcertingly acknowledged instances when the information the monitor displayed was not indicative of the patient's *actual* sedation state.

The researcher, reflecting upon her own engagement with the nurses, was struck by their appreciation of being asked their opinions about the responsiveness monitor use and its potential impact on their care. Interestingly, since the trial of the monitor has been completed the researcher has been asked by staff members how its development is progressing and if they would be using it again. The monitor is currently un-marketed but the interviews suggest it would be a valuable prompt for nurses' practice to re-evaluate and re assess their patients' sedation and a useful tool in the pursuit of 'optimal' sedation and potentially dissipating some of the fear currently surrounding sedation whilst simultaneously assisting in the achievement of 'patient safety'.

Chapter 7.5: Experiential learning and clinical decision making

"Knowing is not enough; we must apply. Willing is not enough; we must do."
Goethe (1749-1832)

7.5.1 Overview of chapter

Many of the decisions made by nurses in ICU are recognised as being complex, often required to be made quickly and in changeable, unpredictable circumstances (Bucknall & Thomas 1995). Each nursing day will be different, each patient's needs will differ depending on the complexity of their illness and each nurse's 'world' will be experienced differently. Clinical decisions draw upon a number of factors. Current healthcare organisations advocate the use of research based evidence to guide decisions in clinical practice (Department of Health 1999). The nursing environment, both physical and interpersonal, and organisational constraints also influence, and are a significant consideration in nurses' decision making. This chapter will explore the nurses 'world' of decision making set against research based evidence, nursing experiences and organisational constraints. It has emerged that despite research based evidence surrounding the promotion of a more wakeful ICU and specifically the performance of sedation holds, this does not make the nurses decisions any less complex. On the contrary, it appears to have engendered yet further complexities. In addition the differences in the experience of the ICU nurse, be it length of time in the ICU environment or the quality and range of intensive care experience, evidently impacts upon their decision making. Critically affecting all decision making are the constraints of current healthcare organisations (White 1995). From the findings thus far the issues of staffing and power conflicts clearly have implications for practice and the nurses' decision making.

7.5.2 Evidence based sedation practice and decision making

The practice of sedation holds has been introduced into practice by a growing body of research based evidence supporting its positive effects on the outcomes of ICU patients. The review of the literature on sedation holds identified that in most of the research data, the control groups identified were 'deeply sedated' patients. Although, arguably, this did represent the ICU population at that time, there has been a delay

implementing the research evidence in practice and the intensive care culture has already progressed to have patients less sedated and thereby more alert and awake. It is therefore unsurprising that the ICU nurses interviewed questioned whether some of their patients *really* required a sedation hold and, more importantly, would benefit from it. This perhaps offers an explanation as to why the uptake of sedation holds in practice has been slow and its application in terms of medical and nursing decision making, discordant. When probed about their feelings regarding sedation holds nurses fail to describe any certainty in their decisions:

"...knowing your patient or trying to predict what your patient is actually going do is quite difficult...I think that probably plays on nurses' minds when they've been asked to do sedation holds....." (Interviewee 009)

"It is a difficult one because we know it is better for the patient but it makes our job more difficult I think... I never know whether we should do it or not in any one patient. It is never ***obvious*** *to me whether you really should or not"* (Interviewee 005)

"Patients waking up is one of the hardest things we have to witness here, because people are uncomfortable; they get a fright. You know it is quite nerve racking sometimes because you just don't know what is going to happen..." (Interviewee 004)

This is surprising, considering it is suggested that research based evidence should

"reduce clinical uncertainty; that is, finding relevant research will increase one's certainty that a particular course of action is most likely to lead to the desired outcomes" (Thompson et al 2004 p68).

This uncertainty appears irrespective of their length of nursing experience nine, six and five years ICU nursing respectively. A further consideration required is that of the "desired outcome" (Thompson et al 2004) as a result of applying research based evidence in practice. It is already apparent perceptions of what is a 'desired outcome' for their patients differs between nurses and medical staff. For the nurses their decisions appear to be more immediately focused, avoidance of agitation, extubation of the patient and psychological wellbeing but saw the medical staff to be more concerned with national targets and longer term outcomes: reducing ICU stays in particular and hospital length of stay in general. Does this highlight a potential limitation of blanket implementation of such research based evidence, suggesting evidence needs to be considered more closely to reflect the same patient group on whom it is then implemented? Equally, are there sufficient resources available to

implement the changes effectively and are the consequences really known (Berry & Zecca 2012;Higgs & Jones 2000)?

Medically driven decisions

Keeping abreast of the current research based evidence requires 'real time' changes to be made to current practice (Evidence-Based Medicine Working Group 1992;Haynes, Devereaux, & Guyatt 2002). Usually changes occur following serious review of new evidence which then underpins national guidelines but are perceived to be driven by medical staff. However, the changes to practice are then often nurse implemented, and, as in the case of sedation management, it is the nurses' practice that might undergo the most significant change but by a 'top down' approach from the medical staff:

> *"... I think the biggest interest…is from the medics who want to get it* [sedation] *down, and then for the nurses, I think it depends on how much knowledge they have about the whole sedation issue, how much of an issue over-sedating patients is and I think then .... on how willing the nurses are?"* (Interviewee 014)

The medical staff are driven by the research based evidence supporting sedation holds, the inference being therefore to be on a good and uniform knowledge base, whereas the nurses' knowledge base has emerged as being variable. The immediacy of the negative effects of sedation holds appear to have made an impact that far supersedes research based evidence. Many of the nurses are demonstrably afraid "*You know it is quite nerve racking sometimes…"* (Interviewee 004) and feeling less than enthusiastic about performing them. Despite this, a sense of responsibility is evident amongst the nurses to ensure that the holds are implemented – whatever their inner sentiments:

> *"I do think it is a good idea to be looking into getting patients awake more quickly. Sometimes thinking back to when I was more junior here, it would be a case of wait, wait, wait for someone to come and tell me what to do. I think it is a good idea if nurses have more responsibility for getting their patients a bit more awake, taking the initiative and cutting back on sedation if it is safe and appropriate... I think it is a good idea to get the patients woken up a bit quicker, if it is going to get them off the ventilator any quicker."* (Interviewee 003)

The nurses in ICU have sought to develop more autonomous roles (Fairman 2004) and welcome the responsibility to make decisions about their patients' care. However, in relation to wakeful ICU patients and sedation holds not only do they

lack autonomy but also feel unsupported with the consequences of the imposed implementation. Irrespective of the compliance suggested by the nurse quoted above, there still appears to be a sense of detachment from the decision making for sedation holds whilst at the same time being responsible for its effects and consequences:

"Well it just seems that people are pushing sedation holds on all, everybody... [Interviewer: Which people?] *More often the doctors… sorry (laughs)... because they come round and put your sedation down, or put it off, and then you've got the aftermath of trying to get that patient to breathe again properly and get the ventilation back under control."* (Interviewee 006)

Although there was a clear sense of reluctance to admit this, it became increasingly apparent that the nurses do not feel part of the decision making process in sedation holds

"The doctor has said switch off the sedation, so the sedation has been switched off and then they go away ...and the patient has then woken up, is very uncomfortable and you have to wait for the doctor to come to see the patient, because either they're not happy for you to re-start sedation or if you just went ahead and re-started it anyway as it was before, sometimes doctors don't believe you and it's almost like they've got to see the patient being very agitated or uncomfortable before they will say okay" (Interviewee 010)

"...well ultimately it's their patient [doctors] *...if the Consultants want it* [sedation hold] *then I'll do it...but I think it is our responsibility... we should be doing things like this because it does benefit the majority of patients, there are just a few that are a bit too sick to start reducing their sedation..."* (Interviewee 006)

Rather it is seen as a practice change put upon them, with no decisional involvement but obligated to go with another's decision. Feelings of discomfort also emerge when the nurse above mentions the medical staff, laughingly apologising "*sorry*", resonating with earlier findings. Why the nurse apologised made the researcher reflect upon the position the interviewee may have perceived the researcher to hold. Did the nurse see the researcher as more 'medical' than 'nursing' as no longer practicing as a clinical ICU nurse or the desire not to appear uncollegial? Whatever, the lack of involvement in decisions potentiates a sense of exclusion and potentially hinders nurses developing their autonomous role:

"It can also be a frustrating thing...if there's been a medical decision to have a patient more awake... the medical decision is…. stop all sedation and we will see what happens… and then the medical staff aren't around and there are no options for re-sedating ..." (Interviewee 010)

Traynor (2009) argues that if nurses suffer from indeterminacy and feel that any sense of autonomy is undermined, this does not promote effective and individualised decision making or even decision making at all in this arena of care. It would appear though that the autonomy of the nurses to make and act on the consequences is also undermined as this nurse asserts:

> *"It's a very frustrating thing to have an agitated, uncomfortable patient, just because the doctors decided let's wake them up. That can be really frustrating... bearing in mind that I can't prescribe* [sedatives or rescue therapies]... *You know a prescription might allow me to have some autonomy in when and where sedation is used..."* (Interviewee 010)

Whether this perceived exercise of power by the medical staff, leaving the nurses with no prescriptions available for them to administer post sedation holds, is just a thoughtless act or due to their belief that the nurses have a preference to re-sedate/over sedate patients following a sedation hold, is a moot point.

Clearly the medical staff are perceived as controlling sedation management with little regard for the nurses' plan of care or the consequences of sedation holds, omitting nurses completely from the decision making process. The inference has to be that decisions being made do not therefore represent a team approach to care. There is a clear indication nurse's see themselves as the change implementers rather than the initiators. Whether this is due to knowledge, organisational structure or power is a yet another moot point. Whatever the reason, the negative consequences of sedation holds appear to have a strong and lasting effect on the nurses.

Advocacy and evidence based research

As the patients' advocate, nurses feel an all-important concern for their patients' comfort and described the agitated behaviours following sedation holds as distressing both to observe and manage. The following nurse sums up the disquiet felt:

> *"To be totally honest 'I' haven't seen the benefits of it as in….does it help the patient being woken up every day? I don't know if that's coming back yet. Are we getting to that stage that the patients are remembering the wakening periods? I don't know if that is helping them or not..."* (Interviewee 006)

Regardless of the evidence supporting the long term benefits of more wakeful periods, the patient's immediate comfort and safety takes precedence during the nurses' decision making. However, the lack of evidence surrounding the patients'

'experiences' of agitation causes the nurses unease. Perhaps if there was a stronger evidence base dispelling the potency of the perceived negative effects of agitation on patients, nurses may view the current distressing observations differently? They would perhaps perceive it more as part of the overall process of helping the patient rather than merely causing them unnecessary distress militating against their professional duty of care. Incorporating patient preferences in ICU decision making is inherently difficult as patients are often unable to communicate verbally. ICU nurses see a critical part of their role as safeguarding the best interests of their patients (Henderson 2006). The notion of advocacy clearly plays an important part in the nurses' decision making on sedation holds.

Clinical experience, protocol based care and evidence based research

Evidence based decision making cannot be applied to practice in isolation; it should be combined with "clinical expertise" and "patient preferences" (Thompson et al 2004 p68). The nurses clearly do not feel that their clinical expertise holds any value, at least in opposing a sedation hold. Furthermore, the aspect of 'clinical expertise' poses a different problem for inexperienced nurses as they have less 'experiences' to draw upon and are more likely to follow a very precision and structure driven decision making pathway (Benner, Tanner, & Chesla 1992). Here, for example, an inexperienced nurse welcomes the structure and standardisation that research based evidence offers him in his practice:

"It standardises care more I think...I think it is good if it has got an evidence base behind it. I know what you mean… it has got to be holistic, so you have still got to be able to act, and ...have autonomy but at the same time to have a standard protocol, so that everyone knows what to do and when to do it, and then if they understand.....other implications or other factors ... they could change it slightly, but to start off ... following the protocol"
(Interviewee 001)

This structured decision making could be problematic since "research evidence should not be taken at face value and adhered to uncritically but should be given an appropriate weight in a decision depending on its internal and external validity" (Thompson et al. 2004 p68). There is acknowledgement by such as Endacott (1996) that it is a challenge to ensure the balance between delivering holistic care and evidence based care.

Guidelines and protocols, guided by best available research evidence, have grown in application across healthcare practice. They reflect current best evidence, are deemed to assist with clinical decision making, minimise the possibility of error and standardise care provided (Vincent 2011). Importantly, they are devised to be used by all levels of nurses, inexperienced and expert. Clinical tools such as the RASS assessment tool was described by the nurses as assisting them to make decisions regarding their patients' sedation:

"You would want to wean off your sedation more when your patient's RASS was -3...I go by the RASS ... RASS as in safety, so you don't want a positive RASS, you want a 0 to -2 RASS" (Interviewee 012)

"I do my RASS ...and see if they're ....deeply sedated... then change my sedation" (Interviewee 014)

However, clinical assessment tools are not free from the effects of subjectivity in their interpretation. Despite attempts to make their use systematic in approach, individuals will interpret signs and symptoms they are using to make assessments differently depending on their experience, experiences, and organisations may adapt tools to fit their specific clinical practices (Elliot 2006;O'Connor, Bucknall, & Manias 2010). This following nurse illustrates this when she describes beginning her shift with an unknown patient and being asked to perform a sedation hold. She must rely on her peers' recorded scores to aid her decision making:

"It is very difficult to come in and, after half an hour, they are saying do a sedation hold, because you don't really know that patient. You're taking what is documented but you know, I think sometimes, you know the parameters are good for all your RASS and your GCS…. but some people do kind of document things differently." (Interviewee 007)

They are feelings supported by this nurse too:

"The scores that we use to measure sedation are subjective; one nurse would do one score and another nurse could have a completely different score... If you had them literally next to each other at the bed they could have different scores..." (Interviewee 001)

Although RASS has been identified as having high inter-rater reliability (Sessler et al. 2002), subjectivity still appears to be present. However, it can only be inferred that the nurses' decisions regarding sedation levels are not entirely based on the assessment tool which was developed for this exact purpose (Sessler et al. 2002). Interestingly, as already highlighted, the use of GCS is not recommended for the assessment of sedated patients (Price, Miller, & deScossa 2000), yet the nurses still

describe it as a score they rely on during sedation decisions. Here another nurse describes that whilst using the sedation monitor she still preferred to use scores that she was more comfortable with, such as GCS to assist with her decisions:

"I was using my RASS score but my GCS more so, because I'm more familiar with it and probably felt it was more reliable." (Interviewee 016)

The use of the GCS to assess sedated patients' conscious state is clearly considered outdated and superseded by better evidence, yet still appears to be embedded in clinical practice. This may be indicate that the nurses' security lay in established practices and new practices generated insecurity, irrespective of the robustness of the evidence. This notion was raised as a potential implication for the behavioural response to the responsiveness monitor earlier. Unfortunately uncertainty in decision making is not simply eliminated through the presence of protocols and guidelines. They need to be used correctly, Lloyd and Reyna (2001) suggest this is dependent upon "not only patient characteristics but also on decision-making characteristics" (p728).

It would appear that inexperienced nurses welcome the assistance with decisions through evidence based protocols. They perceive this, as discussed, as reducing the possibility of incorrect decisions, and moreover, errors occurring. Yet, in relation to the evidence base for sedation reduction, it is apparent that caution should be exercised if the patient group for the practice change differs from that of the original research, and the protocol developed may not indeed be 'best fit'. As nursing experience is developed, and 'expertise' is achieved it appears that it is reasonable and accepted within nursing practice then to modify the protocol drawing on learning and knowledge acquired from 'experience' to guide decisions (Benner 1984a;Rolfe 1998).

Accessing the research based evidence

If nurses demonstrate a varied understanding of the evidence based research surrounding sedation holds, the question arises as to how exactly the nurses are gaining their knowledge and making their decisions? It became evident from the nurses that they often secured their 'evidence' from their nursing peers:

"...your colleagues have had different experiences about what works better... if you have got a patient that is not responding to a certain type of...say the CVVH machine...for example the

nurse beside me today... has worked in a unit, specifically in the renal unit, so I always try and learn something from her when I am working beside her. I mean I don't have that machine today but she has just got years of experience with it, and I think I am competent with it but there is always a few things you know that just come with experience and with somebody telling you" (Interviewee 004)

This resonates with Thompson and colleagues' (2004) findings where the usefulness of information sources was often based on experience of what 'worked' in practice rather than evidence based research. Nurses appear to want to avoid 're-inventing the wheel' if there is somebody who already has the knowledge. However, what does this mean if the 'knowledgeable individuals' are not providing the correct knowledge? As Gobet and Chasey (2008) suggest "knowledge acquired through experiences within a domain determines where attention will be focused and thus what will be perceived...[and] what is being perceived determines what will be learnt" (p133). This is significant if one considers a nurse who has acquired, or observed, negative experiences reflecting fear and loss of control for nurses and may then perceive the whole notion of sedation holds as a 'negative' for nursing practice. Unfortunately, nurses' decisions in terms of sedation management appear, on occasions, to be made using a combination of a misinterpreted evidence base and unhappy experiential learning. This echoes that described by the nurses considering ICU technology, where the picture emerged of nurses, despite specific training courses for new ICU technology, sometimes they were still left to 'learn on the job'. This occurred as training delivered was often time limited and due to large staffing complements it was not always possible for every nurse to be trained. Furthermore, long periods elapsed between training and use or the use of certain technologies was too infrequent to maintain full knowledge from training sessions or build experiential learning. It emerged that they often relied heavily on other staff to demonstrate its workings and support them in its use. Benefits of sedation holds for patients may be explicit but often the research evidence fails to reflect or embrace 'real life' situations and the consequences that occur as a result of new practices. This is when peers are seen as able to 'bridge the gap', as expressed here,

"Colleagues are perceived as delivering context specific, clinically relevant information that takes into account the needs of the judgement or decision situation and requires minimal critical appraisal; and they are time efficient" (Thompson et al 2004 p72).

There would appear to be impediments to nurses using medically based evidence to inform their clinical decisions for sedation. The evidence seems to have been filtered and fragmented, lacking a team approach to support the changes to be implemented. The nurses appear to appreciate the evidence but are neither allowed the autonomy to implement the changes nor, by the same token, gain the confidence to make decisions:

"I don't think that the bed-side nurses should be the only one responsible for doing sedation holds. I think...when the doctors come and do their morning assessment...the first thing they could do ...is to come and say right, 'have you tried a sedation hold?' 'No, right, let's do it now' So there is at least one other person there.... If they[the patient]wake[s] up with a 'bang', you know that there is somebody there to hold them and somebody there to give .....to put their sedation back on…but, the [the doctors] ask you, if you've done a sedation hold, and then they walk away and leave you...I don't see why they can't help you do the sedation hold" (Interviewee 012)

7.5.3 Organisational constraints, sedation practice and clinical decisions

Staffing shortages were described by the nurses as having a significant impact on their working environment and fundamentally the decisions they made, and were *able* to make. The nurses anticipated the implications of a patient becoming restless against the current ICU workload demands as key considerations during decision making:

"...he was a patient that even if you reduced the sedation a little, he would get restless and pull at lines so what I did was to keep him sedated, until maybe after breaks as we would need to extubate..." (Interviewee 002)

According to Standing (2008), a well-managed and well-resourced healthcare system is needed to support effective clinical judgement and clinical decision making, and Paley (2004) stated that poor management of resources undermines patient care. Safety is at the forefront of a nurse's mind and as nurses, they have more situational awareness than any other healthcare staff; they are embedded in the contextual routine (Benner 1984):

"The nature of the staffing levels these days is that ….you are also keeping an eye on other patients; you are doubling up for breaks..." (Interviewee 008)

"... [Staffing levels determine]*....how busy you are definitely, how much risk you think the patient is going to be… in terms of actually waking up and pulling their tube..."* (Interviewee 005)

The decision to reduce or stop a patient's sedation is inextricably linked to the staffing levels, compounded by environmental factors in the ICU:

"Today I'm in bed 6 and I'm doing breaks with cubicle 18 and I'm meant to be weaning my patient... and he's quite lively. That would never have happened six years ago. I would never be doing a break with a cubicle, ever. Cubicles always got covered themselves... So that's quite difficult, because then I question when I'm on my break whether I increase my patient's sedation to make him safe..." (Interviewee 012)

The nurses perceive the doctors to be less than empathetic and supportive about the pressures they feel from the healthcare organisation. Yet as the literature review reported, clinical decisions can be directly affected by the environment in which they are made (Croskerry 2009;Currey & Worrall-Carter 2001). The willingness to perform sedation holds appears to be directly influenced by the particular by nature of the ICU environment. The nurse feels unable to preserve patient safety in this stressful and busy environment, for example, as identified, if watching two 'wakeful' and potentially agitated patients in order to facilitate refreshment breaks:

"It would not actually be fair to the person who is taking care of the patient covering my break, and then again there are not many people on the unit as well.....so it would be better to keep him sedated until I return from my break and extubate then perhaps when almost everyone is around ... These are some of the things I am thinking about." (Interviewee 002)

Situational awareness seems a key factor for the nurses when they are considering reducing their sedation. It would seem that there is a possibility that patients might be kept in deeper sedated states, as the ICU environment itself does not facilitate a safe environment for the management of more wakeful patients. A 'team approach' to care also emerges as the nurses express concern for their colleagues and the additional burden that may be placed upon them as a result of their decisions. There are feelings of empathy and sympathy in the nurses' decisions and the workload consequences of an agitated patient.

The nurses feel responsibility for *their* patients for the entirety of their shift, as demonstrated in Vouzavali and colleague's work (2011) where the nurses described their patients as 'belonging to them'. In the excerpt above the nurse, wishes to preserve patient safety and limit additional burden for colleagues, but also wanted to be present for the patient's potential extubation. He wanted to follow through his care, be there from start to finish; complete the process. Delivery of high quality

care, being able to give their sole attention to their patient, was an important aspect of their choice to pursue an ICU nursing career (see Chapter 7.1). Patient safety cannot be preserved if organisational factors do not maintain adequate staffing or facilitate optimal decision making (Aiken 2005). Insufficient staffing can lead to poor decision making outcomes and possibly an environment where detection of complications may be delayed and an increased risk of errors be evident.

Healthcare's national targets

Healthcare organisations are under pressure to meet national and government targets, irrespective of the staffing issues that may be apparent. These targets are another factor that influences the decision making of the nurses. The following nurse acknowledges the decisions to be:

> *"...* [good for] *the patient primarily obviously, good for the patient's family, good for us, good for…. I don't know whatever targets we might have, patients through the door, big knock on effects, good for A & E, they can get patients up here quicker if we have got empty beds."* (Interviewee 009)

The organisational pressures are clear, and clearly influence the decision making processes of the nursing staff, particularly the 'expert' staff who manage the ICU. This begs the question, as to whether the economically driven healthcare system is benefiting the patients it serves? This may be particularly the case if these pressures are influencing the decisions nursing staff have to make in order to meet 'targets'. Can these decisions really be described as always being in the best interest of the patients?

7.5.4 Experiential knowledge, sedation practice and decision making

The concept of expert decision making has been much debated in nursing literature. The argument could be made that evidence based practice, and the changes implemented because of it, fail to reflect or consider 'real-life' practice, the nurses' 'world' or the organisational constraints and consequences. The nurses' experiential learning, gained in the ICU 'world' appears to be taking 'second place' to evidence based practice and not held in the same regard as the measurable quantitative evidence being used to guide current practice. Yet, there has to be a critical place for the nurses' experiential knowledge and the 'experiences' drawn from their world.

The nurses' experiences are formed from 'moment to moment' observations and interaction with their patients. It is a more individualised approach to care in contrast to the usual 'blanket' implementation adopted by evidence based practices. Here one nurse tries to describe when he felt he 'became' an expert ICU nurse:

"I don't know...I mean, maybe, maybe when we came here so [the hospital and ICU moved premises in 2003].....*though saying that is only three years into my ITU career, it sounds a bit cocky I suppose... (laughs)...it all kind of merges into you know a bit of a .....there is no definitive kind of 'Ah', ... moment"* (Interviewee 009)

Nurses' expertise is a crucial factor in decision making (Hoffman, Aitken, & Duffield 2009). Expert decisions appear to reflect the use of more intuitive responses. Interestingly just as intuitive behaviours are often difficult to describe, there is difficulty defining expert too. Often expert is associated with time, the number of years of experience gained. The following nurse had been describing that it was her 'expertise' that she used to adjust her patient's sedation, when probed further about what exactly that 'expertise' was, she said:

"What gives you expertise?...working here nearly six years..." (Interviewee 012)

Firstly, there is some hesitancy elicited. It appears impossible to place exact chronology to expertise, even although this is initially indicated as a determinant by the nurse. Although Benner (1984) suggests that experience is gained over 'time', she too, as noted in the literature review, does not indicate a specific time frame. Instead she states that clinicians are often unaware of their knowledge gains. The nurse, quoted above, appears to be suggesting that it is her years of experience that gives her expertise whereas Easen and Wilcockson's (1996) rightly recognises that having experience does not *necessarily* give you expertise but undeniably the expert nurses has developed "finely tuned abilities that come from many hours of direct patient observation and care" (Benner 1984 p4), as reflected here:

"I think everything comes with experience, doesn't it….. so you know sometimes that you have to pre-empt certain things...so there is a bit of a difference...How I judge patients and the likelihood of them being so agitated has actually changed as well... I think it comes with experience I must say." (Interviewee 002)

Experience, both a global and specific, influence nurses' decision making, as can be seen with the descriptions from the nurses of certain patients whom they perceive to be more likely to be agitated during sedation holds and reductions. However, it is the

negative responses, such as agitation and adverse events, that the nurses describe, as the 'experiences' that they remember most vividly and appear to have the most impact on their future decision making.

The influence of nursing experience

It emerged from the interviews that often the nurses felt that the medical staff gave little heed or regard to their decision making, despite their close relationship and constant interaction with their patients. However, interestingly, the degree of experience a nurse possesses *is* perceived as an advantage. The opinions and reservations of more experienced nurses, although they are more likely to deviate from the structured protocol driven care, are seen to be taken more 'seriously' by medical colleagues:

> *"Because you work in a closer contact with a lot of the consultants here, they get to know you; they're familiar with your face. Even now, a year later, I have a better, I won't say relationship, but they will listen to me more than they did six months ago... because they're used to me, I suppose and maybe they trust you...maybe there's a bit of that."* (Interviewee 016)

> *"...sometimes how much they trust you... depends on whether people are under-confident themselves...It's them* [medical staff] *being confident in trusting you and accepting what you say, so I think it depends on the medical staff... possibly if* ***you*** *sound more convincing...I think trust and respect is earned over time...Fifteen years in the same place is maybe a bit long. You can do it in less than that but I am sure that comes with time. .. It doesn't necessarily come with experience, in the sense that I could come up against somebody, and I have still got the same experience, but if they don't know me....."* (Interviewee 008)

This resonates with the findings of Coombs (2003) where she reported that "credible clinical experience was useful to achieve input into decision making" (p131). However, where does this leave the less experienced nurses? They are following the protocols and guidelines set out to ensure that evidence based care occurs and fewer errors are made but, out with adherence to such protocols, it would seem they may be unable to contribute little in the decision making process as they lack clinical experience. Furthermore, healthcare settings such as ICUs have high levels of staff turnover and many medical staff do 'rotations' through ICU settings, arguably militating against the development of the professional relationship with nursing staff that leads to confidence, trust and perceived credibility.

Intuitive clinical decision making

'Expert' nurses are felt to draw less *overtly* on analytical forms of knowledge to support their decision making and seemingly make more use of their 'intuitive' knowledge. (Benner 1984) The concept of intuition echoes through nursing literature and recognised as an important part of the expert decision making processes (Benner & Tanner 1987b). The legitimacy of intuition is much debated (King & Clark 2002;McCutcheon & Pincombe 2001) but it is clearly used in nursing practice - and to excellent effect by experts (Benner 1984). The following quotation clearly illustrates the use of intuitive decision making:

"Someone who [pause]*... it's difficult to quantify. I don't know, you would just ... look at the patient and think ... they're ready for a sedation hold"* (Interviewee 009)

It is difficult for this nurse to describe how he makes his decision to perform a sedation hold. Benner (1984) cites work by Polanyi (1958), "The expert always knows more than he or she can tell" (p43). When probed further about how he 'knows' and expands:

"I would look at what ventilation they're on. I look at what other 'meds' they are on, I would look at what their 'obs' [vital signs] *had been, I would look at their history, why they're in there….. all kinds of things and base my decision on that....."* (Interviewee 009)

What emerges is very much a holistic approach to assist in the decision making process. However, this is not necessarily explicit to the researcher, or the nurse for that matter. Their thinking and decision making has almost on 'auto pilot'. Patricia Benner's work supports this. She asserts that intuition is not guess work, a foolish misconception, but reflects the recognition of similarity and of a deep situational involvement, indeed the six key elements discussed previously (see p74) (Benner & Tanner 1987b;Dreyfus & Dreyfus 1985). Professional knowledge and experience form the foundations of intuitive decisions (Benner 1984). The nurses held their 'knowing' of patients in high regard as facilitating their clinical decision making:

"Having been with the patient for some time I know that he is very sensitive. The moment you would turn it [the sedation] *down even a little...he tends to be a bit more restless… so if I put it*[the sedation] *off he would come out of it quite quickly..."* (Interviewee 002)

Unfortunately, intuitive decisions appear to be invalidated and mistrusted by medical staff (McCutcheon & Pincombe 2001). Yet, and ironically, when the elements of intuitive reasoning are actually broken down and it appears that, although covert, they are indeed quite rational considerations (Benner and Tanner 1987). Here one

nurse again raises the issue of trust and credibility as she describes how the nurses' experience and knowledge can be dismissed by the medical staff:

> *"Sometimes doctors don't believe you and it's almost like they've got to* ***see*** *the patient being agitated or uncomfortable...depending on the doctor and depending on I suppose their trust in the nurse really...Usually when you are a bit more experienced doctors trust you a bit more…. but not always."* (Interviewee 010)

It would appear that the nurses sense that the doctors will ultimately make their own decision and judgement of a situation only arbitrarily respecting the nurses' thoughts. This is despite the nurses spending more time at the patient's bedside than the medical staff. It could be argued that the intuitive behaviours of nurses should be given more consideration during the decision making process, particularly considering the interpersonal relationships nurses form with their patients and the importance nurses attach to this for their role (Henderson 2006). This supports the feelings elicited from the nurses, that their decisions reflected their role as patient advocate and provides insight into the loss of control they described when their autonomy is invalidated or over ruled in the decisions made regarding 'their' patient's care.

Many of the nurses referred to their knowledge of the patient and the 'one-to-one' care as a key driver in pursuing a career in ICU. Benner and Wrubel (1989) suggested that critical care nurses were in a very privileged position, well placed to be promoting the 'art' of nursing, a noted key element in the development of knowledge (Carper 1978), through their close interaction with patients. It seems unfortunate that the nurses interviewed feel the medical staff did not seem to value this particularly as being part of why the nurses had chosen to do what they do. Even more so if we reflect on Fairman's (1992) views where she argued that such nurses have a strategic position in the political process of health care decisions (see p82). Nurses occupy a critical role in safeguarding and coordinating their patient's care. If nurses are excluded from decision making processes, team decision making is not being fostered, and according to Benner (1984) this will lead to a "ritualized chain of command" in which "patient comfort is sacrificed" (p144). She continues by arguing that medical staff should write flexible orders that allow nurses to use their judgement. This unfortunately is not the way in which the doctor-nurse relationship

appears to have developed in regards to sedation hold decisions, and also, disappointingly, is not part of the 'scientific' world of evidence based medicine and protocol driven care.

7.5.4.1 Conflict, power, and decision making

Despite the nurses feeling that their decisions and opinions were given more 'weight' with their increasing experience, conflict and power issues were clearly evident through the interviews. The nurses openly seek assistance from their nursing colleagues.

"I think it is like all things - getting confidence in your decision...in that particular area. As you have more experiences when people do wake up very suddenly ..... you just get more confidence and you are able to say I don't think this is appropriate... Well, I usually check with the Charge Nurse because I don't feel just my opinion on that is enough yet"(Interviewee 004)

However, they are reluctant to seek this support from the medical staff as their experiences seem to have been 'their [medical staff] way or no way' with no sense of a team. However, it could be argued that seeking knowledge from peers from the same knowledge base as their own is understandable? Nevertheless, the nurses feel unsupported by medical staff regarding their sedation judgements and this appears to have encouraged less confident and less autonomous decisions to be made. The following nurse, irrespective of her five years of ICU experience still seeks reassurance for her decisions from more senior nursing staff. According to one 'expert' nurse, the inexperienced nurses will find it even more difficult to oppose medical staff orders stating it is:

"...something that a junior member of staff wouldn't do. A Consultant will come round and say to them, I want this patient to have a sedation hold and they will just do it, and even if they thought they shouldn't have one, they would probably still do it because the Consultant had told them to..." (Interviewee 009)

Inexperienced nurses require support with their decision making skills which, it has been established they are more likely to be ruled by a very structured approach to care protocol driven and in the early days lacking any discernment that might question this. The expert nurses occupy an important role in facilitating the growth of the inexperienced nurses, offering support and an environment that they feel they can seek advice and ask questions, not naturally granted by the medical staff. Many

of the nurses feel powerless in the face of medical staff when trying to justify their decisions not to perform a sedation hold. Although inexperienced nurses were less likely to question and oppose the decision, expert nurses still described medical staff's orders as having the 'last word'. In an environment where team decision making is deemed the best approach to deliver care, the nurses feel despair. The traditional and historical hierarchical relationship between doctor and nurses remains:

"At the end of the day it is their decision I suppose, you know, so they're the ones that are driving it [sedation holds]*, so it is their decision"* (Interviewee 016)

Even the valiant expert nurse concedes;

"Well, they'll put their case forward but you've just got to put yours forward and say well this didn't work. We have done it the last two days and we have ended up going backwards instead of forwards. Ultimately it's their patient … and really if the Consultants want it, then I'll do it, but I will put my case forward first." (Interviewee 006)

It could be argued that the nurses do not have the in-depth physiological, biochemical and pharmacological education and knowledge of their medical colleagues to make the optimal decision. Interestingly, a little further in the interview the nurse quoted above contradicts herself:

"...ultimately we make our decisions for our patients whoever is on that day. It is our responsibility..." (Interviewee 006)

Although contradictory it would be argued that she is referring to the strictly nursing domain or that she is expressing 'ideal' sentiments that belie the actual activity. When probed further about who really was in charge of the decisions being made about the patients she said:

"It's kind of...well it's multi-disciplinary isn't it?" (Interviewee 006)

There is uncertainty evident in the nurse's response as she appears to be looking for confirmation and reassurance from the researcher as to where nurses 'fit' within the decision making process with a team decision approach favoured. Another nurse, however, suggests more confidently that sedation holds are ultimately nurses' responsibility; they are the implementers:

"Nurses are responsible for doing it anyway, and we do it but you know, I've never seen a doctor say - right, we'll go and do a sedation hold and sit and wait and watch for the patient to come round and obey commands and ... and then leave ***them*** *to it and say 'get on with it' (laughs)... It would be great. Do you know what I mean? They get fed up with us enough*

when we're on our breaks, so how would they like it if there wasn't a nurse around and they were 'told' to do a sedation hold." (Interviewee 012)

This nurse clearly feels the doctors to have little insight into what effects their decision making and if they really experienced the 'world' of a critical care nurse, maybe they would appreciate the complexity and dilemmas they face in the best interests of their patients and, indeed, for the whole ICU team. This supports the momentum for more interprofessional learning, to ensure that such insights are both gained and maintained to facilitate more effective team working, and in turn, patient benefit (Carpenter 1995).

The failure of communication

Unfortunately, the traditional nurse-doctor roles that have emerged in ICU sedation management suggest that communication between the two groups is less than ideal. The nurses interviewed suggested that not only were their opinions and decisions given little credibility by medical staff but often they were not involved in the process at all:

"They're quite good at saying 'switch off sedation' or 'no we don't want this, we don't want that', but then they walk off and they're not the ones at the end of the bed for 12.5 hours..." (Interviewee 007)

"They come round and they will put your sedation down or put it off and then you've got the aftermath..." (Interviewee 006)

"When they're reviewed by medical staff they say 'no keep the Propofol off' or whatever because they've just come over and assessed the patient within ten seconds... They don't see the outcome; they just say 'no keep the Propofol off.' (Interviewee 015)

Communication is a key part of decision making. Currey and Worrall-Carter (2001) suggested that strengthening communication improved decision making. The latter quote raises the question as to the basis of this medical decision. The driver of 'evidence based medicine' would suggest that the medical decisions look at the long term: the evidence of ultimate benefit for the patient whilst the nurses' decisions are more holistic, incorporating other patient and the situational factors, and more concerned with the immediate outcomes. There appears to be no discussions between the medical staff and the nurses and the communication between the two groups fundamentally poor. The impression emerging is that the nurses are made 'redundant' during the decision making process, the doctors making their decisions

in isolation, exerting implicit and explicit 'power' over the process. This leaves the nurses feeling helpless and perplexed, whilst still having responsibility for their patients' care. Benner (1984) reiterates the importance of communication stating "nurse-physician trust and communication is important – it will affect the way in which a nurse will approach a situation" (p7).

7.5.5 Sedation monitoring and clinical decision making

A number of negative emotions have emerged from the discussions around a more wakeful population and the performance of sedation holds. The sedation monitor appeared to offer support to the nurses' decision making. They perceived it as a technology they could perhaps use to justify their decisions regarding their patient's sedation:

> *"Well there you are there's your proof that if you were somebody less experienced…you could say, well look, even on this sedation they've been fairly restless..."* (Interviewee 008)

The nurses suggest that medical staff sometimes question their accounts that a sedation hold 'failed' or their patient became agitated and unmanageable, requiring re-sedation. The sedation monitor was seen as providing a visible 'back up' to their decisions and, by so doing, would give them confidence in their decisions and in turn foster recognition and autonomy. It is ironic perhaps that a 'technical device' could restore the power balance between medical staff and nurses in clinical decision making by giving evidence that is 'visible' as opposed to 'invisible' intuition. One nurse stated that the monitor could indeed potentially dispel ambiguity surrounding sedation management:

> *"I personally would like more direction than just the RASS score ...the monitor is giving me more confidence in the decisions that I am making from just looking at the patient myself."* (Interviewee 001)

In addition, it furnishes the nurses with insight into the effects, even relatively small infusions or boluses of sedation may have on their patient's conscious level. This insight may be fundamental to their practice. The depth of sedation is currently an 'unknown' in comparison to other trends such as heart rate and circulating fluid volumes, all of which are continuously monitored and projected on to screens to aid their decisions. It appears that the sedation monitor unveils the 'unknown' sedation that informs and/or confirms their decisions. As one nurse comments:

"I have added a little bit of Propofol and she has just 'plunked' right down into the red... It's interesting to see that because...although having worked with sedation all these years, it is interesting to see what it does, so from that point of view, it's just made you think a bit more..." (Interviewee 007)

*"It made you realise that you know the patient is sedated but how **far**, how **deeply** sedated they were which you wouldn't know obviously..."* (Interviewee 015)

It would seem that the nurses might not always be aware of their patient becoming over sedated. The monitor encouraged the nurses to think more about their patients' sedation and make changes and/or more frequent assessments to avoid their patient moving into the 'red zone' of over sedation/unresponsiveness. The monitor is perceived as a comfortable and welcome addition to the 'world' of the critical care nurse as the previous chapter revealed.

7.5.6 Summary of chapter

ICU nurses decision making in relation to sedation management is currently under studied despite the significant changes to sedation practice. Insights into the ICU nurses' decision making surrounding sedation offers assistance in tackling the poor experience of sedation holds. The research based evidence behind the sedation changes appears to have filtered into practice in a fragmented manner, and moreover has offered the ICU nurses little reassurance or certainty for their nursing practice. Nurses perceive themselves as having no ownership of the sedation hold practices, their professional decisions being undermined or over ruled. The 'standardisation' of care and the drive for error reduction in practice through the use of research based practices seems to militate against both the use and recognition of nurses' experientially gained clinical judgement. Such judgements, it is clear, vary according to the expertise established, identified it must be acknowledged, essentially as a function of time, and therefore exposure to learning, in ICU. The nurses and medical staff strive for the same positive outcomes for their patients, but the medical staff appear to make decisions strongly influenced by research based evidence. On the other hand, the nurses take a more holistic view seeing: a 'whole' person assessment with the entire myriad of influences recognised and embedding compassion within their technological care. Organisational influences on clinical decision making, such as staffing levels and nationally set targets, appear to be underestimated. Yet, the interviews demonstrated the impact these have on decisions the nurses make.

However the most potent message emerging in the arena of sedation management is that, whatever the expertise of the nurse, it is the medical staff who are indisputably the decision makers and the advocated team decision making approach fails to feature. Whether the sedation monitor could play a part in altering this picture has yet to be tested.

Chapter 8: Discussion

8.1 Overview of Chapter

The ICU nurses' interviews revealed a number of important issues for their 'world' of a potentially more wakeful ICU population. Many of the issues appeared to overlap and often merge with each other. This discussion hopes to unravel and explore these findings and discuss their relationships and implications for ICU practice, and of course, importantly patient care. The researcher has presented the arguments as to why the interpretive position is being guided by Heidegger's philosophical hermeneutics in Chapter 6. There has been little exploration in the published literature of intensive care nurses' relationship with the sedation they administer, or how they make their decisions regarding it. In a period where significant changes are being implemented within sedation practice in ICUs worldwide, of which the nursing staff are the primary implementers, it seemed appropriate and necessary to explore what meaning these changes have for the intensive care nurses' 'world'. The implicit relationships, beliefs and perceptions that the nurses held as part of their 'being' (Dasein, human existence) have been made explicit. The nurses' world could only have been described by them; their experiences are unique. As Crotty (1998) illustrates "We are beings-in-the-world. Because of this, we cannot be described apart from our world, just as our world-always a human world-cannot be described apart from us" (p79). In order to bring meaning and understanding to the texts elicited, the researcher has been able to draw upon her affinity with the intensive care environment. It is such a link that, according to Crotty (1998), makes the mode of hermeneutic understanding feasible. However, such affinity undoubtedly left the researcher with a number of pre-understandings to acknowledge. The use of the hermeneutic circle encouraged the researcher to use such pre-understandings but not be led by them, be open to new findings and move back and forth between these to develop new knowledge and understandings. In addition, the researcher will offer ways in which nurses could regain their professional autonomy and confidence surrounding the sedation management of the patients in their care, which will include the potential place for the responsiveness monitor.

8.2 The 'whole' patient

Nurses described a great sense of needing, wanting, and being able to 'know' their patient. Carper's (1978) patterns of knowing, a combination of empiric, aesthetic, moral, personal and a suggested fifth element by White (1995), socio-political knowledge, underpin the development of proficiency and skill through a nurse's professional progression. The concept of 'knowing' emerged as strongly influencing their decision to pursue a career in intensive care and underpinned their decision-making processes thereafter.

Nursing is identified in much of the literature as an 'art' in addition to a science, Pedreira (2011) suggests that it is "the art of nursing that places the patient and their families at the centre of care, and allows the nurse to advocate on the patients behalf" (p159). Intensive care nurses are often in a position, due to the complexity and acute nature of their patients' illnesses, to be caring for only one patient. Hence, the interactions and rapport they are able to build is often much more intense and personal than may be possible in other hospital ward settings. This is irrespective of the fact that many of the patients are not conscious during periods of their stay in ICU and may not remember the intensive care nurses at all, and more sadly, some may not survive to remember. According to Gramling (2008), it is the vigilance, the empathy and care they provide for specific patients that constitutes an 'art'. The researcher's findings would concur that the intensive care nurses do indeed embed compassionate care within the highly technical environment of intensive care. According to Endacott (1996) there is risk of this being lost if we are not vigilant

"Whilst a specialism such as intensive care lends itself naturally to a more interdisciplinary approach to care, it is essential that changes in the nursing role retain the essence of holistic nursing practice" (p195).

In the nurses' narratives it became explicit that they put a high premium on maintaining a holistic approach to care. They described how they embedded technology within compassionate care, strongly defended maintaining their patients' individuality and how this assisted them in the development of 'knowing' patients. These feelings are supported by Beeby's (2000) work on intensive care nurses'

experiences of caring, which emphasised how the nurses perceived patients as psychosocial beings, not merely as human organisms in need of intensive care support. In contrast, the concept of sedation holds appeared to make the nurses feel as though they were losing control over the patient in their care. This loss of control impacted upon their role, explained, in part at least, by the findings of Vouzavali et al (2010) wherein the nurses appeared to 'claim' their patients from other members of the multidisciplinary team in both a protective role and a perception that the patient belonged to them; they 'owned' them. Interestingly, it was proposed by the authors, that the nurses *needed* the patient for their own personal development and growth and it was the relationship they formed with the patients that affected the way in which they interpreted their world. This is succinctly expressed by Vouzavali (2010)

"The shared time and space between a nurse and a patient is awash with forceful experiences, implicit encounters and strong feelings impenetrable by all others. The experiences of caring permeate nurses' self-perception, personal and professional identity..." (p148).

Watson described this as "interdependence between the nurse and the patient" (1979 p7). The principles of the SPSP are discussed later but it is worth briefly considering them here against the nurses' desired 'holistic' care approach. The SPSP is a patient centred programme. However, although not the ethos of the SPSP, it would appear that it is perceived by the nurses interviewed to assume that patients' 'needs' are fairly constant, essentially viewing patients objectively. The patient centeredness would *appear* to have been overshadowed by the need or requirement to meet a target or complete a bundle task. This arguably conflicts with the nurses' desired approach to care delivery. The ICU nurses already embed technology into their compassionate care in order to maintain 'holistic' care, find themselves trying to preserve and protect their patients' 'individuality' within targets and practice changes they see as being driven by the SPSP. Furthermore, the nature of critical care illness, as illustrated in the literature review, is unpredictable and dynamic. ICU patients' 'critical illness journey' is often brittle, requiring continuous monitoring of their physiological parameters to inform their treatments; much more so than in other hospital wards. This in itself should indicate that 'system' changes, which essentially

adopt a 'one size fits all' approach, may probably be more difficult to embrace in ICU settings, even if this is not the intended approach of the SPSP. The Heideggerian perspective would be that the nurses *need* the patients to assist with their 'being–in-the-world'. Heidegger asserts that "Beings reveal themselves through *care*" (Heidegger 1962 p254). It is *Dasein's* (human existence) occupation with 'concern' that forms their 'being-in-the-world'. This 'concern' is developed through the awareness of time or 'temporality' that is inevitable as part of 'being-in-the-world' (Warnock 1970). The perceived 'system' approach of the SPSP is arguably at odds with the development of the nurses' 'being-in-the-world' too. It impedes the nurses 'knowing' of their patients which they require not only for their nursing development but also to facilitate the delivery of quality care. With respect to sedation practices, the nurses strive to adopt a patient centred approach, adapting to the needs of the patient. In contrast, they perceive the targets and practice changes of the SPSP to drive an *everyday* 'protocol' approach which appears to be being applied to *everyone*, all patients receiving the protocol driven care. The nurse's role is primarily to care. Many have a wide experience looking after critically ill patients and an acute awareness of the seriousness and unpredictable nature of critical illness; their caring is intense and often time limited. This in part offers explanation of why the nurses felt excluded from the decisions on sedation holds, burdened with any negative consequences of a sedation hold and professionally and personally accountable for any subsequent adverse events. The patient is centre to their care; demonstrating, in the nurse, a strong need to assist and help the patient through their critical illness to reach a favourable outcome. Galvin (2010) illustrates this, stating that as intensive care nurses "we do not *just* wish to technologically control, rather, we also wish to restore equilibrium, restore the person that is there, restore their wellbeing. " (p171). However, the interview data revealed that there were times when the nurses appreciated that their role clearly required them to be more technologically focused and (even if unknowingly) their patient *required* them to be more technologically focused too. This is supported by Galvin (2010) who defends the prioritisation of technology on occasions

"There will be times when it is necessary and legitimate to prioritize the technical, to support the body through collapse, and to embrace objectification. There will be other times when it is important to mitigate the objective gaze for the sake of restoring the person as a being with a past, present and future." (p170).

Patients in intensive care are more often than not unable to communicate their needs verbally; therefore nurses inherently inhabit a role of advocacy for their patients. The nurses perceive themselves as the voice which temporarily their patients do not have. The role as advocate poses a great sense of responsibility on the nurses, namely the need for their patient to be comfortable and, more importantly, safe. The national patient safety programmes appear to oppose the advocacy role the nurses' endeavour to fulfil. The safety programmes are pragmatic 'tick box' systems applied across practice, although designed to improve safety they have been applied to complex interventions and essentially naturally oppose a patient- centred and dynamic ICU 'world'. Potentially this will manifest as conflict between the nurse as the patients advocate, and the nurse's role as part of the healthcare team/system. The emotive response that has emerged as a result of the 'shifting sedation paradigm' should also be considered in terms of the nurses' perception of patients in different 'sedated states'; heavily sedated, wakeful, rousable and calm, or agitated states. Although the nurses interviewed, and the published literature would argue, that nurses embed the challenges of ICU technology and the unpredictability of critical illness in their delivery of compassionate care, the researcher considers whether the nature of interpersonal compassion is subtly different when caring for an over sedated and motionless patient. It is not that there is less compassion for these patients but rather that the interactions will be different. This was reflected in the nurses' interviews, where, albeit with gentle humour, they described a deeply sedated and paralysed patient as 'nice', 'controlled' or 'straight in the bed patient'. In essence, over sedated patients could be viewed as more 'object-like', much of their care interventions being governed by machines and data generated and less able to evoke the same range of emotional response from the nurse as would the wakeful patient. This is supported, in part, by Bergbom- Engberg & Haljamae (1993) who

identify the difficulties ICU nurses may encounter caring for patients who don't exhibit or exhibit very little response

"…[the] inability to achieve a functional communication process is probably frustrating for most nurses and may make them preoccupied with physical rather than with balanced physical and psychological nursing care" (p41).

Similarly, the 'wakeful' patient is able to exhibit a greater range of human emotion, be it through such as undesirable pain, agitation or frustration. They will still require the technological input but their needs and emotions are much more visible and 'real'. This may, in part, offer explanation for the nurses' increased emotional *need* to protect and care for the wakeful patient. The nurses' sense a more subjective 'human connection' with a wakeful patient in contrast to the motionless and deeply sedated 'object' patient.

8.3 'Wakefulness'

The achievement of optimal sedation for ICU patients has become a national target, embedded within a larger programme of work aimed at improving the safety of ICU patients (NHS Quality Improvement Scotland 2009). As described earlier a work stream specifically aimed at critical care that has been developed is concerned with the reduction of ventilator associated pneumonia (VAP). The performance of sedation holds, a key concept in assisting the achievement of optimal sedation, has been embedded within the process trying to reduce VAP. As discussed in Chapter 4, optimal sedation means patients are rousable or awake, and sedation holds are now a daily consideration in order to help achieve this. Essentially, the optimisation of sedation equates to a more wakeful ICU population. There is robust research evidence that more wakeful states can benefit the patients concerned, in terms of both reduced requirement for mechanical ventilation and length of time in ICU (Girard et al. 2009). Although the long term benefits for patients as a result of wakefulness are made explicit, for the ICU nurses 'world', there are other important implications of wakefulness they perceive are being overlooked. The pursuit and ultimate achievement of optimal sedation, for the ICU nurses, goes much further than simply achieving a positive long term 'outcome' or, indeed, a national target. For the nurses

it was the immediate implications for the patient in their care that was significant for the nurses 'being', particularly the issue of comfort and safety. Importantly though comfort is *not* the same as optimal. Optimal seems influenced by the health professional assessing 'optimal' and the context in which optimal is being assessed. It is worth considering that 'timescale' influences the assessment of optimum. The nurses interviewed appear concerned with what they *immediately* see. However, the research evidence and medical viewpoint appears to be longer term, such as, a reduction in the ICU length of stay. This is an emerging contradiction in the view of achieving optimal sedation for patients. Once more there is potential for conflict here between the role of the nurse to deliver holistic patient care, and their role in a larger healthcare team/system wanting to deliver evidence based care and achieve national targets.

8.3.1 'Patient' Safety

An overriding central theme elicited from the nurses was the importance of maintaining a safe environment for their patients. Patient safety has emerged as a primary concern of the nurses interviewed. Although patient wakefulness was desired, the nurses described the implications they perceived it to have for both patients' immediate safety and wellbeing. Pedreria (2011) states that the art of nursing in intensive care "can be seen to include the expression of care that is safe, effective, patient and family centered, timely and equitable" (p159). Keeping patients safe and free from harm was of paramount importance to the nurses and properly reflecting the Nursing and Midwifery Council (Nursing and Midwifery Council 2008), Code of Professional Conduct that directs that nurses "must protect and promote the health and wellbeing of those in your care" (p2). This encompasses the continuous monitoring of risks to patients and colleagues. The maintenance of a safe environment has been made more difficult for the nurses with today's 'wakeful' states. The issue of safety particularly influences the nurses' enthusiasm and willingness to initiate and perform sedation holds on their patients. They harbour fears of their consequences, and worry about the psychological distress sedation holds could potentially be causing their patients and they perceive them to equate to an increased nursing workload - of which there is insufficient resource to manage. An important issue to clarify here is the distinct difference between general patient

wakefulness and sedation holds. The sedation hold is one means to a wakeful world. However, equally the nurses held reservations regarding their patients' safety for both sedation holds and wakefulness. Sedation holds were perceived as an 'unknown', the patient response unpredictable, preventing the nurses from planning and being prepared to manage their patient wakening effectively and safely. Wakefulness, a consequence of sedation holds but also a consequence of the general reduction in the use of sedatives, is often perceived by the nurses to present its self in the form of agitation. The nurses felt powerless to manage these agitated behaviours effectively to preserve a safe environment for their patient and indeed themselves.

8.3.2 'Targeting' Safety

The Scottish Patient Safety Programme (SPSP), as already mentioned is the current driver behind sedation holds. It is a quality improvement strategy aimed at improving patient safety *across* healthcare, not in ICU alone. Quality improvement strategies have gained momentum in healthcare; as a combination of quality control, quality assurance and quality management to improve healthcare services. A survey of quality improvement strategies across Europe highlighted that such strategies are often strongly influenced by governments, medical and scientific bodies and the media, and much less by the service users and patients (Spence & Walshe 2009). Achievement of 'target' compliance is a key aspect of the SPSP; if compliance is met within a certain work stream, evidence suggests patient safety will improve. Unfortunately, healthcare organisations have become increasingly economically driven, outcomes and achievement of 'targets' appearing at times to be taking precedence over the patients in their care. The suggested shift of focus here from a 'holistic' to 'outcome' focus is argued to be sacrificing patient individuality (World Health Organisation 2007), which the nurses find difficult to work within as holistic care underpins their nursing 'world'. However, it is acknowledged that considerable good has arisen from patient safety programmes, such as removing major system problems for example a high prevalence of unnecessary excessive sedation. However, it must also be acknowledged, considering the issues that have emerged from the nurses' interviews, that this achievement alone is not sufficient to influence, and perhaps more importantly, improve the quality of sedation management in ICU. The patient safety programme is still relatively new in ICU and currently, as far as

the researcher is aware, there are no plans to revise the targets set. Arguably the VAP bundle elements, which includes the performance of sedation holds, contains discrete binary interventions, such as head-up tilt which is a 'directly' measurable indicator of quality, with simple 'yes or 'no' options. Whereas a sedation hold is more indirectly measured, the latter clearly illustrated by the nurses' interviews. This would seem to indicate that the sedation hold element of the SPSP might merit further development in order to acquire some concordance in its interpretation by clinicians in the ICUs.

Nowadays, healthcare staff perceive themselves to be constantly under pressure to meet national targets or to defend their position robustly if targets are not met (British Medical Association 2007;World Health Organisation 2007). It could be argued that the pressure to achieve national targets in healthcare settings may be a reason that the nurses are finding it difficult to embed such programmes in to their practice, specifically, in this case, sedation holds. It militates against their feelings about what patient care *actually* is. As already discussed the nurses' interviews highlighted the importance of their commitment to holistic, individualised care. This concurs with Klompas's (2009) deliberations when he reviewed the current national drive to reduce ventilator associated pneumonia (VAP) rates using quality improvement strategies. Although he was more concerned with the diagnostic tests used to determine VAP, he issued a warning which is transferable to the implementation of sedation holds. He said that the "...laxity in the VAP definition confers a risk that some well-intended initiatives may decrease VAP rates, yet provide little benefit to patients and perhaps even put some at risk" (p463). He was highlighting the issue that the way in which VAP is diagnosed differs depending upon the laboratory facilities, and the clinician's experience to perform more invasive techniques to obtain bronchial samples. It is likely that ICUs will report different rates of VAP and treat patients differently as a result. The apparent disparity amongst the nurses' sedation practice and their concerns regarding the performance of sedation holds points to a lack of unity in the rationale for a sedation hold, and management of a patient following a sedation hold. Although sedation holds delivered benefits in some research trials, they may not necessarily be the key intervention required in

some ICUs which already recognise, and have acted on, the benefits of less sedation. Despite the demonstration of long term outcome benefit for patients, it is the shorter term, immediate patient benefits, or indeed a threat of harm, that appear to have been overlooked. It is the implications of sedation changes for healthcare practices and how decision making may be affected by them that merits real consideration. Although Klompas (2009) emphasises that the quality improvement strategies are certainly "well-meaning initiatives" (p463), he also suggests we need a less outcome focused and more accurate measurement, with "maintained consistency to ensure patient benefit from these initiatives" (p463). Klompas's (2009) reservations about target driven healthcare are echoed in the four-hour waiting time target implemented in to the National Health Service (NHS) Accident and Emergency (A & E) departments, which has now been discontinued in England (Royal College of Nursing 2010). The targets were set up to encourage improvements in care, the goals of which were that patients should be treated, admitted or discharged within a four-hour period in the A & E department. Extra financial support was provided as an incentive for its achievement. Unfortunately, the pursuit of these goals created pressure on healthcare staff, risking hurried and inappropriate decisions. It was considered that the financial gains had become the focus rather than the clinical outcomes (Topping & Campbell 2010). A statement was released stating that the healthcare focus would now be about "delivering the best possible results for patients" rather than achieving a target (Topping & Campbell 2010). Although the nurses, interviewed in the researcher's current study, did not specifically identify 'targets' as a pressure on their nursing care, they did, for example, describe the benefits of patient wakefulness in enabling earlier discharge from ICU and the positive effect in terms of making beds more readily available for emergency admissions, This perhaps demonstrating their insight into the targets and pressures elsewhere in the hospital and the need to expedite patients' stay in the ICU. Clearly, reflecting also upon the Accident and Emergency department's experience, the nurses' perception of 'targets', 'through put' and 'bed pressures' in today's healthcare, directly and indirectly influence the nursing care they provide and the decisions they make. Despite the identified concerns of the ICU nurses surrounding wakeful patients and sedation holds, the changes to ICU sedation practice are still encouraged. Significantly and interestingly, the primary purpose of

the changes in sedation management, which was to assist in the reduction of VAP in ICU patients, failed to feature at all in the nurses' interviews. The aim of reducing VAP appears to have been lost in the implementation process, the nurses appearing to be far more focused on the impact of sedation holds on the 'immediate' consequences in front of them, and the primacy of the patient's immediate safety and comfort. Although they did describe reduction of mechanical ventilation and earlier discharge from ICU, both of which arguably are linked to reducing a patient's likelihood of developing VAP, the avoidance of VAP development was clearly not identified as a rationale to perform a sedation hold. The inference must be that this goal it is not the motivation behind performing a sedation hold for the nurses. It would appear then, rather ironically, that a programme of work geared to improve patient safety in healthcare practice has not only lost its focus but is also making ICU nurses feel 'unsafe' in their 'world' as a critical care nurses, and they perceive some of their patients to be unsafe.

Consideration must be given to the other bundle elements of the VAP care bundle, particularly what distinguishes them from the sedation hold element and makes them more widely accepted in practice and their compliance better. Firstly, many of the elements of the VAP bundle, such as chlorhexidine as part of daily mouth care prescribed by the medical team but have minimal overt physiological effect on patients and minimal impact on nursing care delivery as a result of their administration. Ensuring patients are nursed in a 30° head-up tilt position is essentially nursing implemented but is a relatively passive intervention. It has little direct effect on a patient's overt physiological state and does not make them look uncomfortable. Indeed the opposite is more likely. In contrast, sedation holds are seen as the adversary, driven by the medical staff/system, heavily reliant on nursing actions with a direct impact and implications for nurses' care delivery and *their* patients' visible appearance, particularly their comfort. Yet, the sedation hold element has been implemented in the same way as the 'chlorhexidine use' element and with the same level of education for its rationale and guidance on the process. It is clearly the 'direct' impact of sedation holds that distinguishes this element from others in the VAP bundle, making compliance targets much more difficult to achieve.

8.4 Mutual Misunderstanding, Loss of Autonomy and Clinical Decision Making

The nurses acknowledged the benefits of wakeful states for patients but strongly felt that for some patients, sedation holds were not appropriate. They felt their opposition and reluctance to perform sedation holds left their clinical decision making undermined and under appreciated by the medical staff, from which the sedation hold orders came.

8.4.1 Not knowing and knowing

The nurses felt the medical staff undervalued their 'knowing' of the patient, knowing developed by being with the patient twenty four hours a day - a position that Benner and Wrubel (1989) described as "privileged" (pxi). The nurses' felt the medical staff disregarded their perceived privileged patient knowledge as of no substance when they tried to relay their reservations for certain patients undergoing a sedation hold. Patient 'knowing' is linked with the widely debated concept of intuition, which is a skill held by expert nurses. Intuition is held in high regard by much of the nursing profession (McCutcheon & Pincombe 2001), yet it is not always recognised as a valid thought process; especially upon which to base decisions. As Easen and Wilcockson (1996) state it is common to regard "scientific and rational thought [for instance, evidence based medicine] as 'real' thinking...intuitive thinking is considered to be both inferior and unprofessional" (p669). The nursing clinical decision making literature frequently quotes anecdotes from nurses where there is a 'just knowing' or having a 'gut feeling' about their patients; often related to an imminent adverse or unwanted event. This appeared well illustrated in some of the nurses' assessment and behavioural responses to sedation holds. They would often describe how they just 'knew' that certain patients were going to 'fail' sedation holds and/or potentially become agitated following a reduction in sedation. Intuitive 'knowing' is "rooted in past learning, decision making and experience" (Easen & Wilcockson 1996 p669). Intuitive responses, 'knowing', by expert nurses in terms of reservations regarding sedation holds, is based upon their clinical expertise. However, 'knowing', described by nurses who are not experts is essentially based upon the nurses' recollection of negative experiences surrounding them. The 'knowing' that inexperienced nurses refer to is more likely to result in poorer decisions being made as they are based

upon, and highly influenced by, their negative experiences; the pattern recognition, rather than drawing upon their clinical expertise, sense of salience and rationality (Benner & Tanner 1987a). Unfortunately, the *drive* of sedation holds is such that multiple negative experiences are currently common. Arguably, if such 'negativity' is prolonged, it will be potentially be detrimental to inexperienced nurses' development of expertise, a basis for good decision making and may affect the way in which they approach, not only sedation holds, but also other clinical practice changes they may encounter in their future careers.

8.4.2 Research (medicine) based evidence

Research based evidence is often seen exclusively as driven by experimental research, heavily involving quantitative research methods. Notably, it is the abundance of Randomised Controlled Trials (RCTs) promoting positive health and economic outcomes that are driving a more wakeful ICU. The critical concern is whether these types of outcomes, often focusing upon cost and survival, are intrinsically meaningful for every patient. They do not consider the patient's experience, or indeed the healthcare worker's experience. The view that RCTs are the 'gold standard' of research practice is under scrutiny. This is due to the heterogeneous 'case mix' and nature of intensive care patients is increasingly making the 'blanket' application of research evidence challenging. The patient populations in some RCTs cannot reflect all ICU patients, often due to stringent patient exclusion criteria applied. Therefore the application of their results to all ICU patients may not always be entirely appropriate. This is supported by Vincent (2010) who rightly points out that, irrespective of numerous RCTs, the ICU world is *still* struggling to deliver robust evidence surrounding even commonly used treatments such as steroids or positive end expiratory pressures (PEEP). It is due to the cost limitations of such trials that certain outcomes of patient groups are not included and it also means that there are difficulties identifying all adverse events in such RCTs (Vincent 2010;Yazici 2008). This latter issue is particularly important considering the significance of the sedation hold related adverse events identified in the nurses' 'world'. Furthermore, it could be argued that sedation holds are being performed currently in an ICU population where patients, unlike the original research sample form which sedation holds stemmed, are no longer heavily sedated as part of

recommended practice (Girard et al. 2008). This indicates that the research evidence being integrated into current practice may not always be appropriate to today's ICU population as patients are already managed on lighter levels of sedation? This may partly explain the ICU nurses' confusion and support their reservation with respect to the performance of sedation holds. They are being asked to halt sedation on patients in which they *and* the sedation assessment tool would deem are 'optimally' sedated and that are either already wakeful or rousable. This questions the robustness of the current sedation hold research evidence for current practice and calls for research to be performed in patient groups that fully reflect the *current* ICU sedation practice.

The integration of evidence based 'practices' is intended to remove the variability across the delivery of healthcare practices. Yet, it could be argued that the component of evidence base, that of 'clinical expertise', is being forgotten when applied to sedation hold practice (Rolfe 1998). This is supported by Sackett (1997) who clearly states that "The practice of evidence based medicine means integrating individual clinical expertise with best available external clinical evidence from systematic research" (p3). It is the 'clinical expertise' of healthcare staff that enables the otherwise very scientific approach to care delivery to be maintained; it reflects a "...more thoughtful identification and compassionate use of individual patients predicaments, rights and preferences in making clinical decisions..." (Sackett 1997 p3). However, the nurses interviewed lamented that they struggle to make their clinical expertise 'count' towards the clinical decision making regarding their patients sedation level and plan of care. This concurs with White (1997) who pointed out that experimental research, still holds prime place in the hierarchical chain of evidence and that " the least value is attached to authority and the clinical experience of the practitioner" (p175). Rolfe (1998) the importance of nurses being able to use their clinical experience and judgement to aid them making decisions rather than relying only on statistical generalisations offered from research studies. He suggests that accepting and applying research based evidence to whole populations is arguably unprincipled. Such an approach removes patients' individuality and instead suggests we should accept the principle of only doing "the greatest good for the greatest number" (Rolfe 1998 p676). Rolfe (1998) likens nurses to the gardener who "...treats different plants

differently, tailoring the treatment to each individual... [and] must diagnose before he prescribes and then vary the prescription..."(p676). As alluded to earlier, critical illness is rarely straightforward, there is vast heterogeneity in patient pathology, illness severity and patient co-morbidities, the latter having a significant impact on the patient's presenting problems. This diversity makes the treatment of ICU patients' complex and arguably demanding a flexible and individualised approach to patient care to take precedence over a rational, protocol driven 'fix'. Equally, this can be applied to the notion of sedation, for example patients suffering from brain dysfunctions such as delirium will be necessarily far harder to wean from sedation than those without, indicating that sedation management should be tailored to meet the patients' needs not merely to meet a system driven target. It would appear that the two, experimental findings and clinical expertise, are finding it difficult to sit comfortably together. Could this be in part due to the medical and nursing professions have such differing views on how they should be used and which has more 'weight' for the care they wish to provide? However, undoubtedly there will also be occasions when doctors will act upon their clinical expertise and go against the research based evidence. It can only be inferred that the hierarchical structure may be the explanation why this 'deviation' is more readily accepted. Interestingly, these thoughts are similar to those of White (1997) who pondered whether the tensions between the two approaches could ever be resolved. Rolfe (1998) argues that this gap will never be overcome if the nurses' unique encounters with patients are not recognised as unique 'research' in itself and therefore he advocates the use of single case studies. Furthermore, the patient safety programme adds further complexity to the situation. It could be argued that it is the main driver of the more 'thoughtless' implementation of some of the evidence based research by using a process-based approach rather than a patient- based approach. This has been neatly illustrated by the nurses interviewed in terms of treating a heterogeneous patient group, their loss of autonomy and anxiety surrounding their patients' safety. The national adoption of safety programmes perhaps makes it more difficult for people to oppose despite its impact upon team working and morale.

8.4.3 Working Priorities

It has been well established therefore that research based evidence supports a move towards a more wakeful ICU population, essentially achieved using sedation holds. The nurses perceived this evidence to negate any reference to their clinical expertise that may run counter to this evidence. The nurses described frustration with the evidence based sedation hold practice that overlooks the immediate consequences and how these are to be managed. The nurses see the doctors to be focusing exclusively on the best research evidence for their intervention decisions in order to achieve what they perceive to be the best longer term outcomes for patients. This was reflected in the decision making models used in medicine described in the literature review; they are scientific and research driven. On the other hand the nurses have concerns about the immediate outcomes. As described already, the benefits of the research based changes tend to focus around long term outcomes for patients. In terms of both sedation holds and a general reduction in the use of sedation in ICU, it seems there has been little awareness demonstrated of the implications a wakeful ICU patient population may have for the day to day workings of ICU nurses and their 'world'. The nurses described themselves as the implementers, not the initiators, in terms of the sedation management. The medical staff are perceived as occupying the initiator role driving the changes, a role which appears historically embedded in the healthcare system. This is despite patient safety programmes encouraging all healthcare staff to make the implementation of the evidence based changes their 'own' and find a way to embed the changes into their current practice. This may echo a transformational leadership approach, seen as the most effective style of leadership to bring about change; influencing, encouraging and inspiring people toward the same future visions (Peck 2005). However, in reality it appears that the safety programme has simply delegated the less effective transactional leadership approach to the medical staff or in some cases the senior nurses whereby people are relatively passive in their involvement, following orders (Peck 2005). In order to make the changes work effectively the researcher proposes that changes ideally need to be, at least determined if not led, by the nurses at the bedside. For the intensive care nurses' world this emerged as problematic. The nurses felt obliged to implement a change they feel powerless in opposing, a change that has a direct effect upon the

patient they are caring for and one which necessarily impacts upon the care they are providing. The research based evidence underpinning the sedation holds are understood by the nurses. They appreciate the benefits of wakefulness for their patients, and, indeed, for the healthcare organisation, but they feel excluded and undermined in the associated patient-centred decision making processes. In fact, it could be argued that, regardless of by whom, it is actually the patient-centred decisions that are being excluded. Organisational characteristics, including leadership approaches are beginning to be recognised as essential for developing staff receptivity to sedation hold practices (Miller et al. 2012).

Staffing levels were described by the nurses as being a significant constraint on the quality of nursing care they were able to provide. The nurses described their nursing 'world' as 'harder' as felt they had to spend more time reassuring patients and watching patients to ensure adverse events did not occur. It is important to note that a wakeful patient does not necessarily mean that the patient is less critically ill or requiring less invasive technologies. Patient 'severity' has not changed; in fact with the continual development of new technologies and advances in treatments, people who previously would not have survived a critical illness are now surviving but with a lengthening period of critical illness as the technological advancements are increasing survival possibilities (Bastos et al. 1996). Endacott (1996) rightly states that effective sedation management requires the same level of attention as that expected of nurses when traditionally weaning a patient from mechanical ventilation; "[sedation] requires continuous assessment and reappraisal of the patient level of sedation, to avoid under- or over-sedation" (p196). Unfortunately, although the nurses shared this understanding, they felt unable to spend adequate time assessing their patients and found their assessments being influenced more by organisational constraints, such as staffing levels. The picture that emerges of their 'world' is that of nurses spending a majority of their nursing span of duty caring for potentially agitated patients simply trying to preserve their safety but with no additional support mechanisms in place. Unsurprisingly, according to McElroy and colleagues (1996),

"few managers make allowances for changes in health policy when determining staffing levels, not to mention changes in patient dependency, population demographics and nursing workload" (p15).

The nurses consider the delivery of 'holistic' nursing care an essential part of their role and hence their difficulty in focusing on merely the outcomes dictated by research based evidence. However, according to Stein et al (1990), this should not be surprising. He states "it is unfortunate, however, that 'treating the whole person' is more often a matter of lip service than practice among physicians" (p548) and the holistic approach is described as the "province of nursing" (p548). Notably, healthcare has increasingly adopted business systems to measure and evaluate performance. Key Performance Indicators (KPI) are now commonly used to not only examine how well an NHS trust in performing but also to compare across NHS trusts. The KPIs are set by individual trusts where they define goals such as, length of stay, mortality rates, readmission rates and specific rates of infection (NHS Institute for Innovation and Improvement 2008). Although in theory these targets are set to improve the effectiveness of healthcare delivery, cost effectiveness of services and to identify where cost pressures are problematic, in practice targets are expected to be met within the current financial constraints and ever decreasing numbers of healthcare professionals. It is questionable whether in an era of cost cutting and economy by the government, whether an increase in care quality can realistically be achieved? In particular, can this be achieved in complex areas such as ICU sedation whilst still ensuring the provision of high quality patient-centred care.

8.4.4 Team Work and Conflicting Perceptions

Despite, arguably, an appearance of team work and harmony in ICU, the professional relationship between nurses and medical staff has inherent conflict. The common ground they possess is the patients' best interests and a desire to facilitate recovery and the earliest possible discharge from ICU. The mutual misunderstanding between the two professions was revealed in this study to be the conflicting and unresolved perceptions of critical decisions made leaving a legacy of what must be concluded to be nursing resentment. It emerged from the nurses' interviews that they perceived the doctors to think their opposition to sedation holds was simply because they

wanted an 'easier day' with their patient, when in reality it was the safety of the patient that lay at the heart of their concerns. Indisputably though, and recognised by the nurses themselves, a more wakeful, potentially agitated or confused patient does make their nursing shifts 'busier' and more challenging. Yet, the nurses claim they are committed to assisting and watching the patient recover from their critical illness: they do not come to work for an 'easy' day; their priorities lay with delivering care that was in the best interest of the patient. The nurses perceived the medical staff to place little value on their professional experience. Hierarchical issues amongst nursing and medical staff are longstanding with the medical profession historically viewed as holding the dominant position and the nurses even referred to as their 'handmaidens' (Coombs 2003;Jinxs & Bradley 2004). This subservience was not simply behavioural, it also impacted upon the decisions that the nurses should, could and would make about patients in their care. Traditionally the nurses had assumed a role that left the decision making with the medical staff, which became orders the nurses unquestionably carried out. For many years it was considered appropriate for nurses to be subservient to the medical profession, but the complexity of this relationship is realised by Stein et al (1990) "the relationship between the doctor and the nurse is a special one, based on mutual respect and interdependence, steeped in history, and stereotyped in popular culture" (p546). The nature of the doctors' and nurses' relationship has been labelled 'The Doctor-Nurse Game', with the rules including, avoidance of open disagreement at all costs and that the nurses should communicate their opinions and thoughts regarding patients' care without appearing to make them. More recently, Danjoux et al (2009) reported that intra-team conflict amongst doctors and nurses remains a significant problem between professions. The conflict described by the ICU nurses appears embedded in their 'world' and yet must militate against the delivery of effective, quality patient care. As Stein et al (1990) propose "patients depend on the knowledge of both professions for their safety and are endangered by the unresolved difficulties..." (p549). Azoulay and colleagues (2009) in their study, revealed what they saw as the causes of conflict between nurses and doctors. They described a failure to set consistent treatment goals, frustrations towards the hierarchical system that remained in place, placing authority in the hands of the medical team and inevitably, staff shortages. The nurses' interviews demonstrated

the same underlying causes of conflict for the nurses 'world'. Kress and colleagues published their findings of positive associations between sedation holds and patient outcomes in 2000, since then an abundance of literature supports a more wakeful ICU population. However, despite this literature, even a decade on, it would appear that the same issues still apply. The evidence supporting the changes in sedation practice is visible but is somehow failing to meet the needs of the primary sedation 'custodians' - the nurses. Although it could be argued here that this may be the point, that historical behaviours are still embedded; the nurses should only *give* and the doctors *prescribe* and *order*. Weinert et al (2001) argue that there has to be a clear case to promote better team workings between the two professions, not least exemplified in the decisions for sedation holds suggesting that "regularly discussing the goals for sedation among all the affected persons (physicians, nurses, patients', families, and patients) may improve patients' care" (p164). Ironically however, the same study concluded that "a nurse administered protocol that does not reliably achieve nurses' primary goals of patients' comfort, amnesia and safety would be difficult to implement" (Weinert et al. 2001 p164). The pursuit of team work between the two professions is evidently lacking although it has been proven to promote autonomy and improve patient care (Rafferty, Ball, & Aiken 2001), facilitate better decision making (Borrill et al. 2000) and reduce medical errors (Wilson et al. 2005). The nurses' interviews necessarily bring forth the notion of leadership. The medical staff are perceived as the 'leaders', yet when reflecting upon the leadership roles they appear to occupy, it is not entirely surprising that sedation holds have not been as successfully implemented into practice as had been anticipated. Leadership theories indicate that to facilitate successful implementation of changes, goals should be set, targets of accomplish should be agreed, close monitoring of the goals should be take place, reinforcement where necessary should be applied and a reward available (Flin & Yule 2004). Furthermore, effective leadership should be clear about expectations (Firth-Cozens 2001), something which the nurses perceive is clearly failing in the area of sedation practice. There clearly needs to be more guidance and goals set regarding the use of sedation holds and management of consequences; the agitated patient. It is easily identifiable from the nurses' feelings of loss of autonomy, loss of control and fear surrounding sedation holds, that sedation management is not being

led in an effective manner. Disappointingly, the 'polite' battle of equality amongst the nursing and medical profession continues and team work is not truly evident when considering sedation practices and, thereby, necessarily detrimental to the care patients receive, nurses describing their autonomy in terms of the decisions for their patients dissipating and their role as patient advocate undermined. However, the initiation and undertaking of sedation holds would appear to be part of the distress as there still remains issues surrounding clearly defined end points for sedation holds and the subsequent care priorities and management. These are sentiments shared by Berry and Zecca (2012), their focus upon sedation holds, suggest the impact of the process (sedation holds) on the people (nurses, doctors, physiotherapists) has been overlooked. They conclude there is a need for more qualitative research in this area to explore clinicians' views and understandings to facilitate such strategies as sedation holds incorporation into clinical practice.

8.5 'Unintended consequences'

In terms of evidence based practice, the medical team had their eye on the 'prize': reduced length of stay and targets. The nurses on the other hand, seemed unavoidably occupied and concerned with the immediate response of patients to the changes being implemented and the implications this had for both the patients' and nurses' environment.

8.5.1 Agitation

The research based evidence emphasis is the avoidance of over sedation and not the creation of agitation. However, the nurses described agitation as a common consequence in the pursuit of 'wakefulness'. Nurses revealed that such agitated states left them feeling fearful and distressed by the visible discomfort their patients appeared to be experiencing. Tiezte and Wittbrodt (2005) define agitation seen in waking patients in ICU as "a sustained state of apprehension and autonomic arousal in response to real or perceived threat" (p228, cited in Pinder & Christensen 2008 p65). Agitation could simply not be viewed as being part of a 'positive' outcome for the patients and led the nurses to question the benefits of sedation holds. This was regardless of the current evidence suggesting that, amongst other outcomes that increased wakefulness decreases a patient's length of stay in ICU. The nurses

described unease at the somewhat abruptness of the onset of wakefulness, seeing this as both alarming and distressing for the patients, nurses and relatives alike, leading to a reluctance to implement sedation holds despite all the beneficial evidence. Weinert et al (2001) explored factors affecting nurses' delivery of sedation. In his study, nurses viewed the 'amnesia', as a consequence of sedation as a positive outcome for patients. The nurses also found it difficult to comprehend why any patient would want to remember 'being sick'; no nurse recalling circumstances when it would be deemed desirable for the patient to remember their ICU experience. Many of the nurses expressed concern regarding the psychological consequences of patients following wakeful periods. Currently, evidence exploring such psychological effects is still under examination (Oeyen et al. 2010) but notably, research based evidence suggests that periods of wakefulness offer psychological benefits to patients, equally long periods of 'unformed', delusional memory are associated with worse psychological outcomes (Jones et al. 2001). Notably, the research based evidence appears to run counter to the nurses' intuitive reasoning regarding patient awareness.

The nurses' interviews demonstrated that agitation was particularly distressing for the nurses to watch and manage; the nurses' perceived the medical team as seemingly impervious to these fears and concerns. The nurses interviewed, often frustratingly, described the medical staff visiting the bedside of patients during non-agitated periods and unable to appreciate alternative distressing presentations or their effect on the nurses and the care they were trying to provide. Arguably the doctors will have seen an agitated patient in practice which potentially fuels the nurses frustrations further, as they perceive the doctors to assume a detached position from its management and that it is the nurses' 'job' to manage the agitated states. Interestingly, exactly how the nurses are supposed to 'manage' their agitated patient, seems to be driven by the medical staff too, this is discussed later (see p269). Interestingly, and worth consideration, is Weinert et al's (2001) findings that the ICU nurses themselves, if they should ever happen to be admitted to ICU, voiced their preference to be deeply sedated; they did not wish to remember anything. It could be argued that the nurses may assume the same values to their patients' experiences, particularly as already described, agitation is visually distressing.

Another interesting point which requires consideration here is the causes of agitation, it would appear that agitation is deemed the consequence of sedation being halted or reduced. Arguably a reduction in sedatives *can* result in agitated behaviours. However, there are other factors that require consideration, such as pain and delirium, highlighted in the literature review (p61) as contributing factors of agitated behaviours. It should be noted that the nurses interviewed seemed only to be focused on sedation as the cause of agitation and appeared to overlook the other causes. It may be that the notion of wakefulness has been 'oversimplified' and hence they failed to consider other causes of agitation. Arguably, reflecting on the research based evidence the focus should be on achieving 'quality wakefulness' that equates to delirium and agitation free periods of wakefulness. This would require, as part of the patient safety programme, alongside sedation holds, addressing the issues of delirium and agitation, the latter a clinical manifestation of the former. Currently the issue of delirium is not considered as part of the patient safety programme, the use of delirium screening tools are recommended in the literature but do not currently form part of any national targets (Ely et al. 2001; National Institute for Health and Clinical Excellence 2010). It could be suggested that the nurses have highlighted this failure in the systems approach through their bedside role and pursuit of holistic care. The nurses' interviews revealed that the individualised care approach they adopted meant they often considered more than just facilitating a patient's discharge from ICU. They cared about the long term effects, despite the fact they may never see the patient again following their discharge from ICU to the general ward. This demonstrates the nurses' appreciation of the long term benefits of sedation holds despite their immediate concerns. However, due to a combination of transactional leadership, the 'national' implementation of sedation practice changes and the nurses perceived lack of autonomy in the whole sedation decision making process, they lack confidence in their intuitive and experiential findings, and are suffering the effects of subservience and waiting for the medical staff to give the 'delirium order'. On the other hand, perhaps delirium has just simply been overlooked as an implication for ICU practice.

The patient safety programme has gone as far as to focus on reducing over sedation but has failed to look at the consequences of this, particularly the support and educate staff about the management of pain, anxiety and delirium; factors which will become more prominent as a result of a more wakeful patient population. Nurses appear to lack education and equipment to deal with agitation. Broader education around this area might help break the cycle of agitation-fear/anxiety between the patient and nurse.

8.5.2 Fear

Rather than evidence based practice instilling confidence in ICU sedation practice, it has generated fear. The nurses particularly fear the adverse effects of patient agitation, but also unplanned events such as extubations, line removals or falls. This concurs with Weinert et al's study (2001). Moods and feelings, such as the fear, according to Heidegger are of great ontological importance; they are not accidental or meaningless (King 2001). Such emotions encourage 'attunement' for humans. 'Attunement', according to Heidegger makes Dasein (human existence) "approachable, concernible, touchable, strikable, capable of being affected and moved by whatever may approach him from the world" (King 2001 p57). It enhances the development of 'being' and provides them with understanding which enables them to 'care' more effectively (King 2001). In terms of nursing care this means that in nurses the development of 'being' enables them to get closer to and have more empathy for their patients needs. Heidegger describes fear being manifested in three different ways "fear of...", "fear itself..." and "fear for..." (King 2001 p57). To be fearsome, 'fear of...' is acknowledgement that there is something definitive to fear. In the case of the ICU nurses this is easily identifiable as the distressing agitated states and the lack of control they appear to have in managing them. 'Fear itself...' is concerned with 'being afraid'. For the nurses this develops as a result of them experiencing a negative event from the agitation they are in 'fear of...'. For example, an adverse event, unplanned extubation or an injury to themselves of their patient. Arguably, 'fear of...' is further extrapolated by the blame culture currently arguably embedded in healthcare adverse event reporting. Lastly the 'fear for...' suggested by Heidegger can be applied to personal fear or fear for others (property or possessions). From the ICU nurses perspective the personal fear arises as they fear being judged on

their professional capabilities or 'ability-to-be'; how they 'allowed' an adverse event to occur. The nurses also openly fear for their patients, referring to the patient as their "space" and "belonging to them" (Vouzavali et al 2011p144-145), this is reflected in the concern they have regarding the long term psychological effects of agitation and that an adverse event may 'set back' the patients clinical progress. 'Setting back' their patients' progress, also imbued the nurses with further feelings of guilt and failure. They feel guilty as they perceive themselves as having failed to preserve their patients' safety and therefore failed in their duty as a nurse. Furthermore, linking back to 'fear of...'the nurses perceived the medical staff to blame them for allowing the adverse event to occur but who, unlike the nurses, are not themselves continuously present at the patient's bedside.

Although it is strongly argued that the nurses require to have access to rapid-acting sedatives to stabilise patients with agitation or those posing a risk to themselves or the staff (Weinert et al. 2001), the nurses interviewed describe sedative prescriptions being discontinued, leaving no pharmacological provision option for such patients. This links to the earlier discussion of the nurses' perception that it was deemed their 'role' to manage agitation, yet with no available medicines it begs the question how they are supposed to 'manage'. On reflection this is a potentially serious finding for the nurses practice, not only does it demonstrate the position of power held by the medical staff but also there are serious safety implications that verge on immoral and even unethical from a patients perspective. The medical staffs' reasoning for sedation prescriptions being discontinued and rescue medicine options not being prescribed, as is the nurses' 'lived experience' is unknown as their views were not sought for the purposes of this thesis. It could be inferred that perhaps the medical staffs' experience has too been negative, in the sense that they perceive the nursing staff to hastily re-sedate patients following a sedation hold?

The mixed emotions of fear, guilt and blame elicited from the nurses directly impact upon their feelings towards the wakeful ICU population and the confidence they have to perform future sedation holds. These emotions are further compounded by the lack of control they have to alleviate agitated episodes and/or restart sedations should

that be the necessary course of action. Sometimes it is simply feelings of apprehension they harbour about restarting sedatives even when they are prescribed, particularly as the doctor has given the 'order' that sedatives should be halted. The 'control' is held by the medical staff who, not only possess the power to prescribe, but also issue the orders. This 'control' has emerged as undermining the nurses' professional role, and all too recently acquired autonomy (Bakalis & Watson 2005).

8.5.3 Individual Failures and System Failures

Failures in healthcare occur and patients continue to suffer as a result (Institute of Medicine 1999). As the literature review illustrated, the way in which healthcare organisations manage errors and adverse events is still not entirely effective or conducive to preventing repeat errors (Leape 1994). Leape (1994) argued that healthcare must accept that errors and adverse events are inevitable. The individual blame culture should be eradicated and better systems set up to recognise and prevent mistakes.

It emerged from the nurses' interviews that they contend with feelings of anxiety and fear surrounding the potential adverse events as a result of wakefulness and/or sedation holds. Despite research evidence indicating that adverse events are seemingly no more prevalent now following the sedation changes being implemented (Girard et al. 2008; Jackson et al. 2010; Kress et al. 2000). However, caution should be exercised, as often adverse events are measured in the context of the individual study and with a limited set only reported. Study adverse events include physical events such as unplanned line and tube removals, as identified by the nurses, but also include physiological adverse events too, such as myocardial ischaemia. Adverse events are defined by the National Patient Safety Agency (NPSA) (National Patient Safety Agency 2004a) as ''Any unintended or unexpected incident which could have or did lead to harm for one or more patients receiving NHS funded care'' (p1). This definition encompasses much more than the physical adverse events that the ICU nurses identified. However, the adverse events the nurses fear and appear to spend much of their time trying to avoid happening *are* a safety issue. Leape (1994) suggests it is the incidences that 'nearly happen' – the 'near misses', the ones in this case the nurses describe trying to avoid , that (often) go unreported. The researcher

questions whether this is because the nursing staff fear the blame or criticism for their failures? In a bid to be viewed as a "safety critical industry" (Milligan 2007 p96), the reporting of events is being encouraged. In this way it is hoped that the precipitating factors of adverse events can be identified and every effort made to avoid them occurring again. Indeed, as The Institute of Medicine (IOM) identified, errors are common in healthcare, resulting from system failures rather than individual faults (IOM 2001). These different types of failure can be illustrated using sedation holds. The healthcare system has implemented a research based evidence change with patients' best interests at heart, but it appears it has failed to consider the immediate implications of such a practice change as opposed to longer term patient outcomes. Therefore, irrespective of the evidence based aims, the ICU nurses who are the 'implementers' of sedation holds rather than the 'initiators', have been left a grave responsibility for their patients' safety. They describe feeling responsible for ensuring sedation holds are performed irrespective of whether they understand or agree with the decision whilst concomitantly being accountable professionally and personally for any consequences that arise. They sense they are viewed as being 'lazy' if they oppose sedation holds or re-sedate a patient following a period of agitation, and feel blamed by medical staff for allowing adverse events to occur if they do perform a sedation hold. There is no perception by the nurses of team work or collegial support. This picture of 'individual failure' elicited from the nurses interviewed, according to Leape (1994) only encourages errors to go unreported and fundamentally unrecognised and unmanaged. The reporting of 'adverse events', such as unplanned extubation and line removal, through the new reporting initiatives (Datix 2008), may not, in reality, be indicative of the real issues of concern. Rather should it not be the episodes of agitation that the nurses should be reporting? Agitation appears to be a major concern for nurses wrongly consuming substantial amounts of their nursing time. The researcher questions why episodes of agitation, which are perceived as jeopardising the patients' and nurses' safety is not reported? Particularly as agitation is, in essence, a 'near miss', the nurses are clearly managing and supporting their agitated patients in order to *prevent* an unplanned reportable adverse event. It emerged through the nurses' interviews that agitation was viewed as a possible and even acceptable outcome of the desired sedation holds that the

doctors deemed the nurses' role to manage. However, as noted earlier the patient safety programme clearly aims only to avoid excessive sedation *not* condone agitation.

Theme	**Interview Extract**	**Transferable Insight (Meaning)**
Nursing the whole patient	*"...I don't think it's nice for the patients to wake up suddenly. My patient today is waking up suddenly and then drifting off and it's not nice for him..."* (004) *"Comfortable, settled, co-operative, and rousable...I'm very happy with somebody that is awake and opens their eyes and communicates with their family... not coughing on their tube constantly* (014) *" I think if they're comfortable,... they are not agitated and they're not distressed and they're not having that 'knock on' effect on their cardiovascular system or their saturations , I don't mind them sitting up reading their newspaper looking at me… ventilated. I think as long as they're comfortable….It's getting that balance..."* (008)	The philosophy of care. The nurses' care striving to deliver holistic care felt this appeared to militate against the targets to facilitate earlier extubation or discharge from ICU.
Patient Wakefulness -Targets and Safety	*"Good for the patient primarily obviously, good for the patient's family, good for us, good for …… whatever targets we might have, patients through the door, big 'knock on' effects, good for A & E, they can get patients up here quicker if we have got empty beds*." (009) *"I think it makes sense ...patients have no idea what's night, what's day, they're so confused ...disorientated and agitated because they are just completely sedated for ...'X' number of days and then they're suddenly woken up, bolt upright ...I think this is a step forward really. From a nursing point of view it just makes more sense."* (016) *"I think I find a sedation hold much easier because you can just switch it off, they wake up, and you see where they are and then you can also then re-sedate appropriately. While if you wean it down I think it's just going to take you forever and where do you stop, and when I did a sedation hold a*	Conflict emerged as the nurses struggled to achieve national targets and preserve safety despite appreciation of the benefits delivering research and evidence based practice.

	*lot of times, I did not have to go back in as high as you had to before." (*014) *"...some patients if they are awake it's okay...with agitated patients it's difficult for you having to be near to the patient all the time, you can't move away, you have to stay close to the tube..."*(011) *"I can appreciate all the research since and I am sure it is better, of course it is just tougher* [Interviewer: Tougher for whom?] *The nurse and possibly the family...patients if they are on the ventilator for less time well then it's not tougher for them it's just short term pain for long term gain if you like. It is probably more stressful all round..."* (008) *"... if they're more awake, they're going to be more at risk...be more agitated,... be more unsettled. They're probably going to cough more... It's more difficult...It's more stressful for yourself, and you can't do your things, because you need to go and attend to the patient, make sure they're safe ... not pulling their tubes...You suction them more often because obviously their cough reflex is much higher; also you may be more frustrated because you feel you can't really help the patient. The tube is in there.....if it's not going to change at the moment."* (014) *"... how busy you are definitely, how much risk you think the patient is going to be in terms of actually waking up and pulling their tube...Often the patients seem really appropriately sedated when you come on and you think why would I want to stop it?"* (005)	
Mutual Misunderstanding -Loss of autonomy & Decision Making	"*I think sometimes they* [doctors] *think that we put sedation up or down because we just want an easy life, but they forget that we're here to do a job...we're wanting the same as them... to get the tube out or get the patient better. It always happens; they* [doctors] *walk by at the patient's most settled time..."* (007)	Nurses felt their 'knowing' of patients was often disregarded by the medical staff as no substance using their 'power' to exert control over patients' sedation. Ownership and options to manage their patients' sedation was

	"Because they [doctors] *know they've* [the patient] *woken up, so you're going to have to attend to the patient more."* (014) *"...they're* [doctors] *quite good at saying switch off sedation or 'no we don't want this, we don't want that', but then they walk off and they're not the ones at the end of the bed for 12.5hrs trying to do break...I think well they [doctors] are making it unsafe..."*(007) *"...you are then waiting for somebody...medical staff...I would just like them to be around, so you are not dealing with whatever it is* [agitation and discomfort] *for somebody to come and say 'well yes, put it back on or change it to Haloperidol or whatever'..."* (008) *"It can be frustrating if there's been a medical decision to have a patient more awake...There's no option for re-sedating, it's a very frustrating thing to have an agitated, uncomfortable patient...just because the doctors decided 'let's wake them up', that can be really frustrating..."*(010)	lost and a lack of teamwork and effective leadership experienced. The nurses turned their critical gaze inwards to consider the changes in sedation culture and their role in preventing adverse events
Unintended consequences -Patient Agitation -Nursing Fear	*"...if you've got an agitated patient for 12.5 hours, it is very tiring, and sometimes here we double up for breaks, sometime snot an appropriate double and if you've got an agitated patient and they are not adequately sedated but they* [the doctors] *don't ant the* [re-sedated]*...it can be unsafe..."* (007) *"...*[Sometimes] *you do need to sedate a patient a little more in order to keep them safe and make sure they're not going to do themselves, or their equipment, any harm..."*(013) *"I just think that people waking up is one of the hardest things we have to witness here, because people are uncomfortable; they get a fright...It is quite nerve racking sometimes because you don't know what is going to happen..."* (004)	The nurses described agitation as a common occurrence with an acceptance of this as becoming a 'norm'. However fear of the consequences of such agitation such as unplanned line and tube removal generated a sense of guilt and blame.

Individual Failures (IF) versus System Failures (SF)	*"You 'always' feel like a complete failure and that you should have been doing this, that and the next thing… I am used to the days when you were there all the time. You didn't turn your back on the patient; you didn't leave the patient and so that* [extubation /agitation] *really was a failure on your part. Everybody would have thought it was a failure on your part. So that still kind of sticks and there are certain aspects of nursing care that I always want to be able to do, ….. lots of things: talking to relatives, spending more time with the patient …… but we just can't do that in the same way anymore"* (008) (IF) *"...When patients are awake they are more likely…. more prone to reaching for their tubes. You've got to watch them more… There are less staff; you're covering people all the time..."* (005) (SF) *"...We are to keep an eye on our patients ...just because of it getting busier and busier in here; we have got no 'runners' a lot of the time, having to cover breaks that are involving cubicles - stuff like that. It is just safety which I try and advocate all the time because ultimately you need to be able to see your patients"* (006) (SF) *"...I think people forget that it* [sedation] *can go back on. They think 'that's it off now...we're not going to put sedation back on'... I think it just sometimes needs more clarification… especially ...when you think, 'Sedation hold? They are nowhere near extubation!' "* (007) (SF) *"...I think ...if we are going down this way... where people are less sedated we have to accept that unless people are going to be physically restrained...there are going to be episodes where people pull things out. Because of the nature of the staffing levels these days... you are not there all the time...you are keeping an eye on other patients; you are doubling up for breaks...I think we have to accept that these kind of things* [adverse events] *are going to happen."*(008) (IF)	However, there were evidently system (organisational) oversights that influenced the nurses' ability to provide quality care. Lack of staffing resources was seen as a poorly considered, but critical element, in pursuing more wakeful ICU patients. There was felt to be variable education for the management of sedation holds before, during and after its implementation. A pragmatic stance to rationalise the failures (adverse events) in care provision was evidenced.

Table 6: A hermeneutic summary of findings

8.6 Novel Sedation Monitoring

As described in the literature review, the ICU environment has to be technically dominated. As Wikström and Larsson (2004) suggest it is "a tool saturated environment" (p556). Although the debate of the advantages and disadvantages of technology's role in healthcare, specifically in nursing continue, in ICU environments technology must occupy an important role.

8.6.1 An objective solution to a holistic dilemma?

The introduction of another technology, the responsiveness monitor, did not faze the nurses interviewed. In fact, and even ironically against their holistic priorities, they appeared to welcome it as an objective system offering them certainty and reassurance in an area in which they felt it was lacking. Nurses view technologies in ICU positively as adjuncts to their care (McConnell 1990), appreciating that, although they provide physiological information quickly and effectively in order to inform their decisions, they should be wary of developing an over reliance on them. A misinterpretation of the physiological information technology provides could lead to misinformed actions or inappropriate interventions delivered. It appears that the responsiveness monitor could offer technological support and reassurance to a somewhat non-technological patient safety programme. The programme is primarily about changing systems to work more safely and to implement systems more consistently and completely to ensure the changes made are constant, using pre determined and agreed targets (NHS Quality Improvement Scotland 2009). However, the sedation element of the programme appears to be raising more challenges than the other elements of the VAP bundle. Notwithstanding the 'dehumanising' label often associated with technologies in healthcare (Wilkinson 1992), it appears that the nurses would welcome the responsiveness monitor in this context. As argued earlier, the system changes using checklists, procedures and protocols, which play a large part in this programme's work, are not amenable to some of the more complex and challenging changes required in ICU that cannot be effectively managed and monitored using simple binary measures. Checklists can be used to reduce errors (Leape 1994) and assist in standardisation of practice but fail to

accommodate or offer solutions to the "unintended consequences" that result from the changes. Vincent (2010) states that some protocols are too rigid and inflexible and in some contexts can prove a "negative phenomenon... [and] prevent physicians from using their training and past experience to tailor care to the individual patient and situation, and may even encourage poor patient care" (Vincent 2010 p5) as, indeed, illustrated in sedation hold compliance.

8.6.2 Technology to 'bridge the gap'

It is apparent that there is considerable fear surrounding sedation holds. Nurses feel they have no guidance, no warnings, and worry about the potential consequences of their patients waking, all of which is compounded by the reality of insufficient staffing levels in ICU. The argument is that, potentially, the responsiveness monitor could bridge the gap there currently lies between sedation theory and sedation practice, particularly sedation hold practice.

It would appear that despite some reluctance in the nursing literature to acknowledge a unity between nursing practice and technology, it is still being proposed and accepted as an effective way of bridging the theory-practice gap in some areas in practice. This is particularly the case when compliance is poor or documentation failing and errors repeatedly occurring. Monitoring responsiveness and sedation is one example, but similar issues with checklists and form filling have been seen in other areas of healthcare for example in the use of Early Warning Systems (EWS) (Cuthbertson & Smith 2007;Johnstone, Rattray, & Myers 2007), which is a score developed to standardise the monitoring, assessment and active management of acutely ill adults in hospital (Appendix 2). It has been used in healthcare for over five years now and once again irrespective of the advancements in technology, it heavily relies on people completing charts, interpreting the observations they are making and acting upon the records they are making. The system has undergone further examination and failures are still evident. Either the forms are not fully completed or even when the form indicates the patient may require it, staff are failing to act (Gordon & Beckett 2011). In response, novel technologies are being developed to overcome the problems identified with this system whereby technologies will alert healthcare workers immediately of changes to their patients'

physiological signs through a novel wireless patch or telemetry (Breslow 2007;Nangalia, Prytherch, & Smith 2010). Such real time alerts will be monitored from a central station, removing the delay and the issues of user shortcomings associated with checklist and chart filling.

8.6.3 Technology: only as good as its user

As the literature review portrayed, there are anxieties that technologies can encourage dependency and basic nursing skills are lost or forgotten (see p25). Therefore caution should be exercised to ensure that, unlike some past technologies, the responsiveness monitor is an effective, efficient and positive addition to the intensive care 'world'. It should benefit patient care and the practice of the ICU nurse and not merely be introduced because it promises to deliver new 'data', as arguably had been the case with the pulmonary artery catheter (PAC) described earlier (see p24). As with all technologies they are only as good as their users. Harsh lessons were learnt in the era of the PAC wherein the technology was used to optimise patients' 'data' rather than patient 'needs' (Sandham et al. 2003). A number of studies explored physicians and nurses understanding of PAC information and revealed striking discrepancies in the way in which the data was interpreted and used as information to inform decisions and clinical treatments (Al-Kharrat et al. 1999). Iberti and colleagues (1990) reported that PAC data was interpreted differently depending on medical staff's training in its use and the frequency of use. They acknowledged the dangers of such variability in practice and recommended that its use should be restricted to those with a documented competency. This clearly illustrates the importance of understanding data that technologies generate in order for it to solely for the benefit the patient and preserve patient safety.

This also raises the issue of nursing experience. There is evidence indicating that it is the inexperienced nurses that may be more technology dependent and therefore more at risk of not recognising errors that will then inform their decisions (Mann 1992;Wilkinson 1992). Whereas the expert nurses will use their professional judgement more and be less reliant upon the technology. As Benner (1984) reveals, an expert

"no longer relies on an analytic principle (rule, guideline, maxim) to connect her or his understanding of the situation to an appropriate action...with their enormous background of experience, now has an intuitive grasp of each situation and zeroes in on the accurate region of the problem without wasteful consideration of a large range of unfruitful, alternative diagnoses and solutions" (p31-32).

However, recalling earlier discussions about the value of clinical expertise it is still a concept to be fully accepted in healthcare practices.

Reflecting upon the training issue that arose around the use of the PAC, the responsiveness monitor has been developed using simple recognisable features. It uses traffic light colours and familiar waveforms to depict patients' responsiveness level. It is non-invasive and provides information that can be obtained at a glance, hopefully requiring minimal training.

8.6.4 The 'role' of a responsiveness monitor

The nurses' interviews revealed that they clearly feel a lack of autonomy in sedation decisions which has 'chased away' their confidence and encouraged them to detach themselves from the sedation decision making process. The nurses and medical staff are failing to demonstrate a team approach to decision making and the subsequent delivery of care to patients. The responsiveness monitor could offer a visual 'back-up' to the nurses' sedation experiences and anxieties, essentially giving objective viewable data to their subjective and experiential data, the latter described by nurses as problematic in current sedation practice, fraught with frustrations, resentment and blame. Its continuous monitoring offers the nurses reassurance about their patients' responsiveness level enabling them to pre-empt 'wakeful' patient states. This 'early warning' would potentially give the nurse time to prepare, plan, control and have ownership of their patients care. It could reduce the fear and anxieties that currently deter the nurses from sedation holds and reduction of sedation in general. Professional autonomy is essential to nurses' decision making and facilitates nurses to fulfil their role as their patients advocate and deliver effective, holistic and quality care.

An alternative consideration is that the responsiveness monitor could reduce or even remove the need for sedation holds altogether. It has been designed to provide a continuous alert to the possibility of excessive sedation, the prevention of excessive sedation would reduce the necessity of sedation holds indefinitely. If the responsiveness monitor could achieve this in clinical practice, it might too break many of the fear, anxiety and/or conflict cycles that have arisen, restore a united and team approach between medical and nursing staff and patients sedation management

Nevertheless historical and organisational barriers remain, namely the doctor-nurse conflicts that seem embedded in the professions and the economically driven healthcare today for which only a more 'human touch' can resolve.

8.7 Summary of Chapter

This chapter has drawn together the issues that have been emerging through the findings and has attempted to make sense of them and the implications for ICU nurses. There are many insights revealed, all closely interlinked and often overlapping. The nurses place immense value on their profession's ability to 'know' patients and deliver holistic care in an environment in which is often chastised for being technologically focused and losing sight of the unique individual to whom the technology is attached. Unfortunately, they feel these values are 'undervalued' by the medical staff with whom they work so closely. This became evident when the nurses described their feelings of opposition to reducing or halting sedation for their patients; 'their' patients, whom they wish to, protect and keep safe. The nurses would attempt to balance the research based evidence of sedation changes, whilst ensuring no harm and maintaining safety of the patient at all times. In contrast, they perceived the medical staff to disregard and place little value on the concerns of their patients' safety and be more focused upon the positive outcomes associated with sedation hold that of, less requirement for mechanical ventilation, a shorter time in ICU and reduced hospital stay. With their opinions and feelings perceived as disregarded, the nurses felt as though they had lost control over the care of their patient and that their professional autonomy accounted for nothing. Instead the nurses felt obliged to proceed with orders they disagreed with for fear of being

labelled ‘lazy’ or wanting an ‘easy shift’. This was a difficult concept for the nurses to argue because ultimately a more wakeful patient makes their nursing work ‘busier’. The nurses also struggled to understand how the programme of work (SPSP) driving the sedation changes was increasing safety. They actually felt the opposite was the fact, their patients safety was *harder* to preserve. They lived in fear of adverse events. Agitation had almost become an expected even acceptable outcome, of sedation holds. However the occurrence of sedation hold adverse events left the nurses feeling guilty, in that, somehow, they had allowed this to occur and would be blamed for their occurrence undermining their professions’ values. Although there is debate about whether an increase in adverse events in a more wakeful population *actually* occurs, the argument could be that it is the ‘near misses’ that should be accounted for. The nurses perceive much of their time to be consumed calming, reassuring patients and preventing such adverse events. Although adverse event reporting, including near misses are now voluntarily reported, the fear of blame necessarily leads to under reporting. In addition, the nurses perceive the medical staff, to see their role as being to deal with the agitation and prevent adverse events. The responsiveness monitor aims to make the current ‘invisible’ sedation status of ICU patients more ‘visible’, just as is the case with other physiological systems. Although, inevitably it will be viewed, by some, as yet another technology to “dehumanise” patient care (Mann 1992 p58). Whilst recognising the possible pitfalls of the technologies they use and the need for training and education surrounding its use, the nurses accepted the responsiveness monitor as an effective adjunct to their nursing care. It offered control and reassurance to an area of practice in which they currently perceive themselves to have very little. Further research is necessary as effective and timely sedation management is vital to facilitate patient care and facilitate patients’ recovery from critical illness. Changes to sedation practice are needed if patients are to receive the best available care but these changes need to be addressed and implemented by the ICU clinical ‘team’ and not *driven* by targets, power and fear.

Chapter 9: Future directions

9.1 Overview of chapter

In this chapter the researcher proposes a number of recommendations to address the issues that have arisen in this doctoral study and considers potential areas for future research. Firstly however, the researcher will address the limitations of this doctoral work which in themselves generate areas of interest requiring further exploration. Concurrently the researcher will reflect upon the intellectual journey the doctoral process has provided.

The researcher began the doctoral journey with a number of 'fore-havings' (pre-understandings) as outlined in Chapter 6 (see p120). The affinity the researcher held with the ICU setting and the nurses proved both a blessing and a potential bias. However, the personal nature of a doctoral study is notably different from coordinating and leading other's study's essentially *their* ideas and *their* interests. An investment of time and emotion, it is far more intellectually demanding coordinating your own study, having to develop your own ideas that will interest you for at least three years, whilst identifying and facing your own shortcomings.

9.2 The limitations of the study

Firstly, the period of study and exploration was time limited, as is the case with doctoral work and reflects the guidance and regulations of the University of Edinburgh. Although the researcher is satisfied that the data she gathered through her interviews revealed a true and deeply insightful view of the critical care nurses 'world', particularly in relation to sedation management, there where inarguable areas of interest that revealed themselves during the research inquiry process that would merit further investigation. The researcher, with guidance from her supervisors, had to be both mindful of the time constraints imposed versus the 'interesting' nature of the new revelations and to make an intellectual decision whether these should and could be pursued as part of the doctoral work or post-doctoral work. Moreover, the researcher considers that the achievement of deadlines in a timely manner in the process of research inquiry is a skill, and often a necessity, particularly as the researcher may participate in future research studies as part of a

larger team of researchers and the failure to meet deadlines could have implications for others' timely delivery of work. Furthermore, research studies are often independently funded through the achievements of grants, wherein delays to achieve timeline targets will have subsequent cost implications.

Bearing these thoughts in mind the researcher acknowledges that as the nurses' interviews progressed and the issue of conflict and power between the two professions emerged, it would have been both interesting and potentially useful to interview the ICU medical staff to explore their 'lived experience' in addition to that of the nursing staff. However, the researcher knew to persist with her initial study aim which was to explore the nurses' 'worlds' and gain insight into their 'lived experience' and this decision was strengthened by the knowledge that nurses are the main technology users, 'perceived' as the actual 'providers' of patients care, including sedation, and at to be present the bedside more than any other healthcare professional. Furthermore, it became increasingly apparent to the researcher during the research journey that the implications of sedation are not exclusively felt by nurses and doctors but also by other healthcare professionals, notably physiotherapists. Compliance with the treatments that physiotherapists deliver will potentially be better in a more wakeful patient group with the achievement of earlier mobilisation a reality (Schweickert et al. 2009). Undoubtedly exploration of their 'world' would also be insightful.

Equally, consideration of patients' family's views of a more wakeful ICU is also required. Some of the nurses interviewed expressed concern about their patients' family's feelings seeing their relative in wakeful and agitated states, and perceived this unnecessarily distressing for them in what are already stressful circumstances. The researcher presumes that not many families are actually present during an actual 'sedation hold', as these mainly take place out with visiting times, but relatives will undoubtedly see wakeful patients as a result of sedation holds and be aware of a general use of less sedation in practice. The consideration of families' views may be essential in changing their perceptions of intensive care, what is now 'normal' and best practice. Changing families' expectations may dispel some of the stress of ICU and furthermore, the nurses will feel perhaps less pressure from family anxieties to

have patients more deeply sedated? It is an area that seriously merits further research but was, too, beyond the scope of this doctoral work.

Patients' experiences of 'wakefulness' and the ICU environment in general would also have been of interest to this study's exploration, particularly as the patient is the focus of nursing care. The researcher acknowledged earlier in the thesis that this is an area already being explored by other researchers' in the critical care arena. Further evidence as to the psychological outcomes of sedation holds and subsequent wakefulness is required and may provide more certainty and confidence by the nursing staff in promoting both sedation holds and general wakefulness.

In the researcher's role as a research coordinator she is now managing a multi-centre trial of sedation quality across Scotland. The researcher's doctoral work has been used as a basis to inform the qualitative branch of the study, which proposes to interview ICU nurses at each of the sites and undertake focus groups with nurses, doctors and physiotherapists about their views and opinions of sedation practices, and the quality of sedation delivered to patients. This proposed study will be the largest study yet published exploring the quality of sedation delivery in ICU and aims to develop strategies with staff to improve sedation quality. As the earlier research design chapter (see p123) described, the researcher's participant sample contained a good cross section of ICU nurses in terms of gender and ICU experience to build upon.

9.3 Recommendations and suggestions to address key issues

The use of Heideggerian philosophy to guide this study fostered an in depth and honest experience of the ICU nurses 'world' to be viewed. Heidegger's approach made the researcher reflect that, despite her affinity with the ICU setting, assumptions about other people's views can be mistaken and can only be truly explored by letting them tell their story, let their 'lived experience' be known. Notwithstanding, the works of Heidegger and other German philosophers *are* challenging to grasp and challenging to apply to 'real' clinical practice, particularly to enable the wider (medical) audience to understand their significance without a 'p –

value' being available. Inarguably, this philosophy has contributed to the development of the recommendations the researcher now offers.

9.3.1 Potentially resolvable issues

Education

The researcher begins by tentatively offering the somewhat obvious recommendation to address some of the issues that emerged during the nurses' interviews, that of education. The researcher does so tentatively because she does not want the reader to feel that they are simply being offered the 'obvious' and 'clichéd' solution. Education is by no means a 'whole' solution to the issues revealed but it would be equally be an oversight to dismiss it altogether. There were obvious gaps in the nurses' knowledge in regards to sedation practice and an inherent lack of a systematic approach and/or education around sedation holds emerged from the nurses' interviews. It appeared that sedation holds have been implemented into practice on assumptions that the nurse knows the rationale behind them and has an understanding of the other elements that should contribute to sedation hold decision making. There seemed minimal consideration, perhaps indicating a lack of understanding, of issues such as pain, anxiety, delirium and drug dependency. These issues appeared to be overlooked or perhaps more correctly 'overshadowed' by sedation holds and the perceived corollary of agitation. The researcher therefore asserts there is a need to recommend that education on these areas of sedation practice is needed, but not in isolation. Nurses need more ready access to pharmacological measures to manage agitated behaviours. ICU teams, nurses, doctors and pharmacists, must work together to achieve this, ensuring there is adequate guidance for their appropriate use and acknowledging that it is unacceptable and unsafe that patients should be left without 'rescue' medicines or a plan of care for post sedation hold. Equally though, the nurses, time and again, revealed feeling safer and more comfortable with familiar assessment tools and interventions; their preference appeared to remain with what they knew, despite the research based evidence. However, the researcher speculates that this may be because nurses have not, until recently, been offered or been exposed to education and undoubtedly the business of decision making, despite it being key to their role in providing patient care (Thompson & Stapley 2011). The quality of nursing care is entirely dependent

upon the good clinical decision making of nurses and good clinical decision making skills is dependent upon good quality knowledge, nursing experience and the nurses ability to think critically in practice (Dowding & Thompson 2002). The researcher strongly advocates the need for education to develop a broad knowledge base of areas of clinical practice and education to develop clinical decision making skills will be advantageous. However, the optimal way to deliver such education and the nature of the education is still uncertain, particularly bearing in mind that the replication of every decision context is almost impossible (Thompson & Stapley 2011). However, despite this the wider impact of better education and clinical decision making must not be underestimated.

Clearer guidance and meaningful measures of quality

The interviews revealed that the nurses felt little ownership of their patients' sedation but were *expected* to perform sedation holds on direction and manage the consequences. Sedation holds did not have clearly defined endings as to at which point a patients sedation could be restarted and at what rate. The nurses also lacked guidance about what actions should be taken if a patient became agitated and more specifically, or had available and clear options to manage such behaviours. Furthermore, the poor communication between the nurses and doctors resulted in anxiety cycles developing for the nurses surrounding sedation holds in particular and the reduction in sedation in general. The researcher proposes that the definition of sedation holds needs to be revisited by ICU teams, the process needs clearly defined end points, guidance as to what should be done when an end point is achieved and some 'get out clauses'. The researcher considered the use of mnemonics and checklists as a solution. Mnemonics are already used in ICU for example, 'FAST HUG' (Vincent 2005), details in Table 7 below.

Component	Consideration for Intensive Care Unit Team
Feeding	Can the patient be fed orally, if not enterally? If not, should we start parenteral feed?
Analgesia	The patient should not suffer pain, but excessive analgesia should be avoided.
Sedation	The patient should not experience discomfort, but excessive sedation should be avoided, *calm *comfortable *collaborative.
Thromboembolic prevention	Should we give low-molecular- weight heparin or use mechanical adjuncts?
Head of the bed elevated	Optimally 30° to 45°, unless contraindications.
stress **U**lcer Prophylaxis	Usually H_2 antagonists, sometimes proton pump inhibitors.
Glucose control	Within limits defined in each ICU.

Table 7: The seven components of the FAST HUG approach (Vincent 2005).

The researcher considered whether a mnemonic for sedation holds could be developed, but after some deliberation the complexity of the sedation process, as already illustrated, made a simple *and* memorable mnemonic difficult to achieve. Instead the researcher has developed two algorithms that could be applied in clinical practice to aid the assessment and management of agitated patients (Figure 11) and unresponsive patients (Figure 12). Whilst developing ideas for mnemonics and flow charts, the researcher was acutely aware that the suggestions being made were empirical in nature and not phenomenological. The phenomenological journey has undeniably revealed insights into ICU nurses' world that previously had not been known. The nurses' interviews have provided deeply descriptive and reflective information which the researcher has interpreted to reveal the anxieties and difficulties in creating a wakeful ICU population. In order to make meaningful changes to sedation practices, the researcher must first make these new insights known and use them to illustrate the challenges and implications for ICU nurses' 'worlds' by sharing the nurses' perspectives with other healthcare disciplines. However, in order to transfer the reality of the nurses' anxieties and overcome the concerns they clearly illustrate impede their nursing care, the researcher needed to find real solutions, as Goethe (1749-1832) quotes at the start of Chapter 7.5: "Knowing is not enough; we must apply. Willing is not enough; we must do."

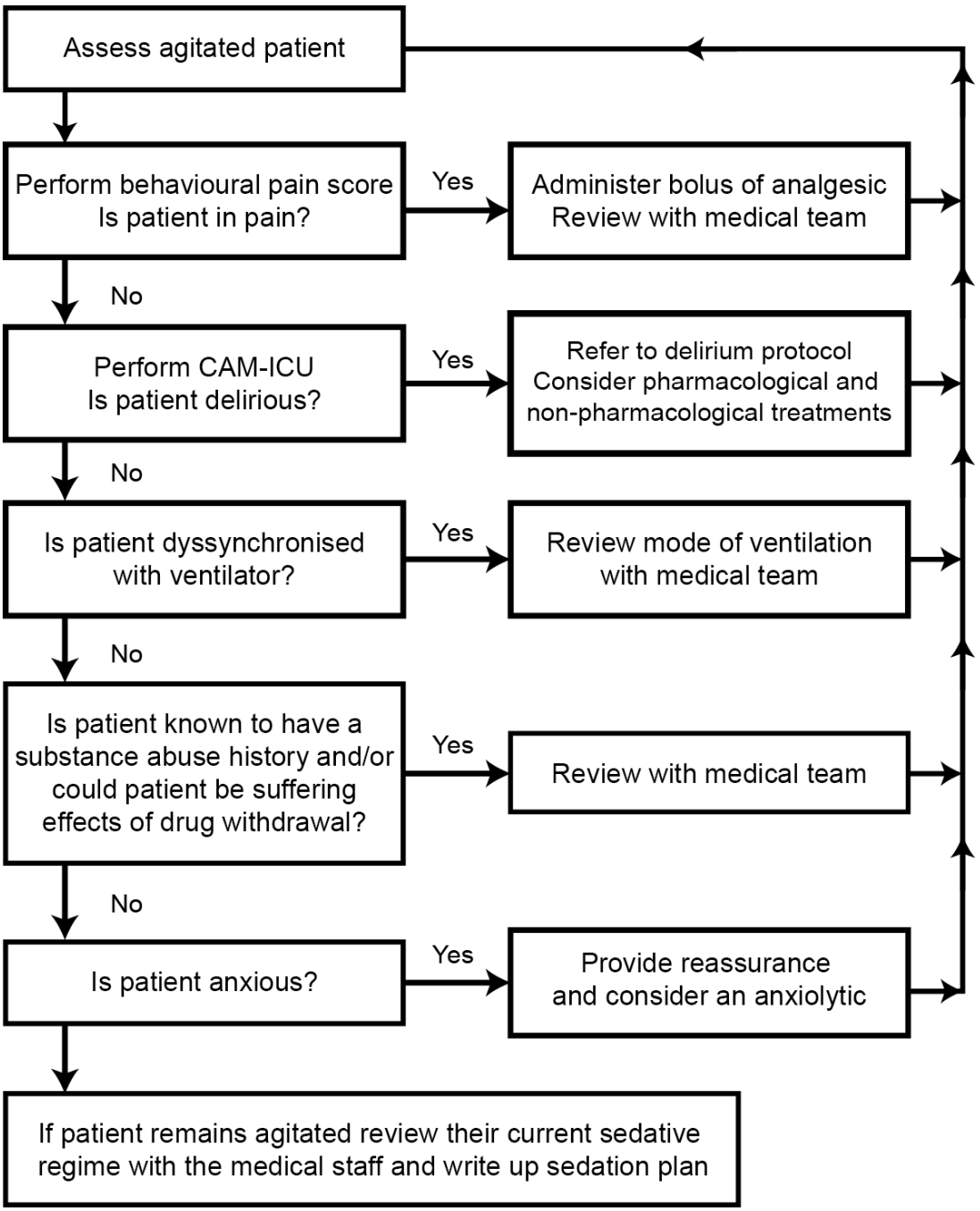


Figure 11: The agitated patient algorithm

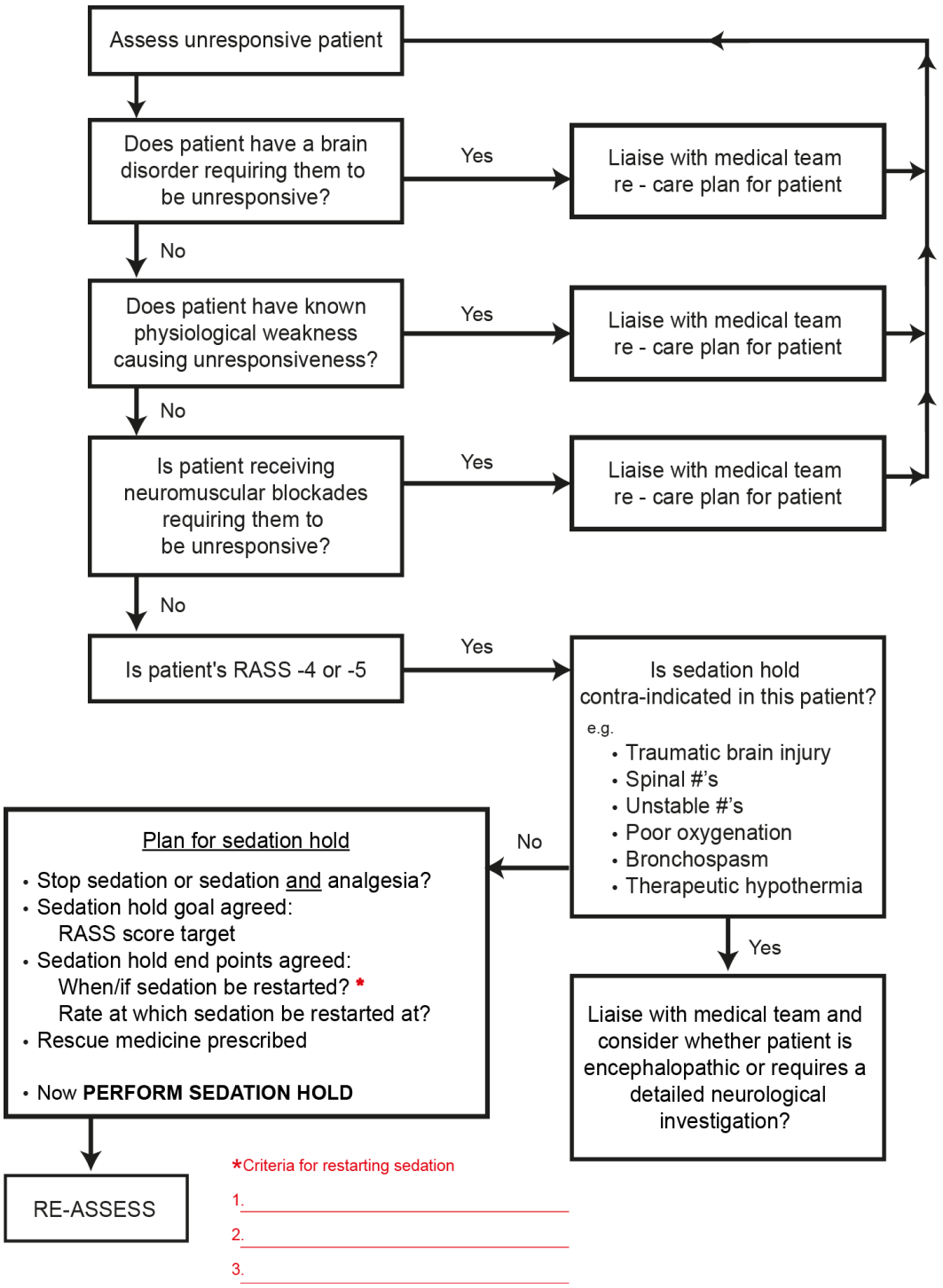


Figure 12: The 'Unresponsive patient' algorithm

The researcher felt an obligation to transform the interpretative data into prescriptive opportunities for clinical practice. The researcher intends to disseminate her findings widely, let the nurses' perspectives be 'heard' but then, these must be transferred and

applied in practice and made 'real' so that changes to improve the nurses' and the patients' sedation experience can be made. The use of approaches that ICU practitioners are already familiar with, such as mnemonics and flow charts, are easily understood and, interpreted and, importantly, are seen as clinically relevant to their practice.

Bearing this in mind, the researcher considered other feedback measures currently used in ICU that could be utilised to make wakefulness and sedation quality more meaningful beyond merely reporting poor compliance with sedation holds. Current quality improvement feedback measures used in Scottish ICU include reporting rates of ventilator associated pneumonia (VAP) and other infections as 'per 1000 patient or ventilator days' or 'by stating the number of days since the last infection'; rightly acknowledging that tabulated results and statistical summaries do not demonstrate the process of change over time. Just as ICU is a dynamic setting, its quality measures also require to be dynamic. The use of statistical process charts (SPC) are commonplace, as part of the SPSP, in Scottish ICUs to meet these needs (Peden & Rooney 2009) (see Appendix 8). The 'lived experience' of the nurses' world was that of fear of agitation and adverse events, the latter inflicting a 'blame' approach rather than fostering a conducive method to address failures in system approaches. The researcher proposes that information relating to the number of 'agitated days per 1000 ventilator days' and/or more 'sedation-related adverse events per 1000 patient days' would provide important feedback detail of sedation quality, building upon the balancing measures of failed extubations already being collected by the SPSP. Adverse events would be those the nurses identified in the interviews, such as unplanned tube and line removals. The researcher feels strongly that some form of additional monitoring in the patient safety programmes is required to monitor additional adverse events, events that are significant to the nurses and healthcare workers at the bedside and impact on their 'world'. There were many different 'faces' of fear apparent in the nurses' 'world' according to Heidegger's philosophy, a significant one being a fear of agitation. Agitation, however, is not reported as an adverse event, yet the consequences of it, such as unplanned invasive line removals, are. It is recognised that the development of additional monitoring, such as the SPCs suggested would need to be done cautiously to ensure reporting measures developed

do not continue to have negative connotations associated with as is the case with current adverse event and near miss reporting. It would be preferable to work with the National Patient Safety programmes to embed this type of monitoring and further raise their awareness of the implications of the national drive to improve patient safety. If adverse events are recorded more systematically then their rates can be used more effectively to drive the improvement in sedation quality and patient care.

Multidisciplinary team working

As indicated the researcher's findings are new and need to be shared amongst the 'whole' critical care team. If team working is to be improved within the multidisciplinary teams in ICU, the nurses 'lived experiences' need to be heard. The researcher has had the opportunity to present her findings to wider audiences including ICU medical staff where the repeated observations were that the findings and perspectives offered had not been a consideration in their own clinical practice. Entire ICU teams need to consider closely the conflict around sedation and the differing perspectives that nurses and medical staff hold. This will require the medical staff to broaden their appreciation of issues raised and engage with the immediacy of the nurses' world, seeing more than just the longer term outcomes of the patient. Equally, the nurses need to be more empowered to question medical staff orders in a setting in which they decisions are valued and whereof their views are not perceived as an excuse to be 'lazy'. An obvious place for these changes to begin would be with the involvement of the current and established quality improvement teams in ICU settings, all of which have multidisciplinary members.

The potential of the responsiveness monitor

The explored implications of a new responsiveness monitor for the nurses' sedation practice led to the realisation that the monitor does require further trials in clinical practice to examine and understand the nurses, doctors and physiotherapists experiences rather than further extrapolation of the benefits to patient outcome.

9.3.2 The irresolvable issues

Staffing in an era of a wakeful ICU emerged as a significant concern for the nurses interviewed. The participation in the patient safety programme to improve outcomes

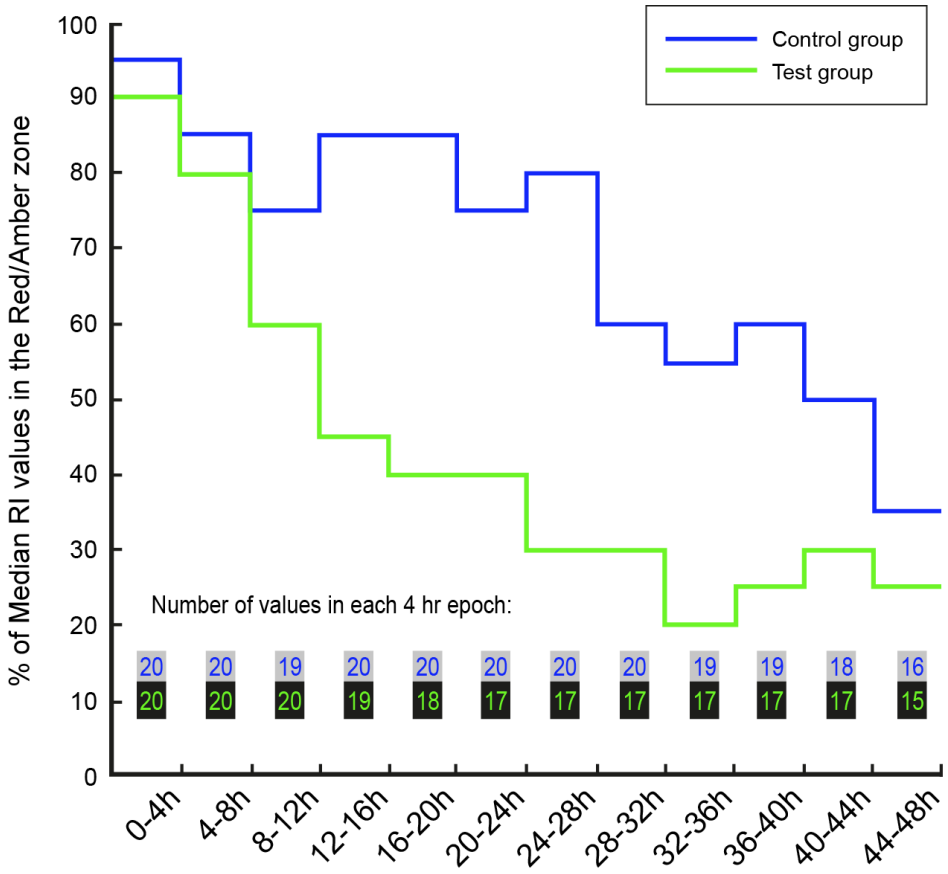
for their patients left them fearing their patients' safety and, indeed, their own. They had the all too real frustration of having to do more with less. Unfortunately, despite ICUs staffing being higher than elsewhere in a healthcare setting, the changes in sedation practice would indicate that staffing levels need to be re-examined if such changes are to be successful and effectively adopted. Staffing remains a contentious issue in healthcare and the current economic climate would suggest that this will not change and, in reality, healthcare staff have to 'work' with what is currently available for providing quality patient care. Arguably, if a team approach could be truly fostered in ICU, it may soften the harsh reality of staffing and would lead to teams working together rather than nurses fighting one battle and medical staff fighting another.

9.4 Summary of chapter

This has been a challenging intellectual journey, even as a researcher familiar with the research setting. Phenomenological inquiry has elicited in-depth, new and somewhat surprising findings. Whether these could have been revealed using alternative methods the researcher cannot, with any certainty, comment. This doctoral study reflects the ICU nurses' current 'world'. The researcher offers perspectives and interpretations with which the reader may not agree, but expects and hopes it has allowed them to reflect upon their own practices and views. The researcher hopes she has successfully defended the need to translate the phenomenological findings into prescriptive and at times seemingly empirical approaches to meet the needs of the nurses 'lived experiences' in clinical practice. There are potent and interesting avenues of further research required that the researcher will consider more closely in the near future to build upon her doctoral findings.

Appendices

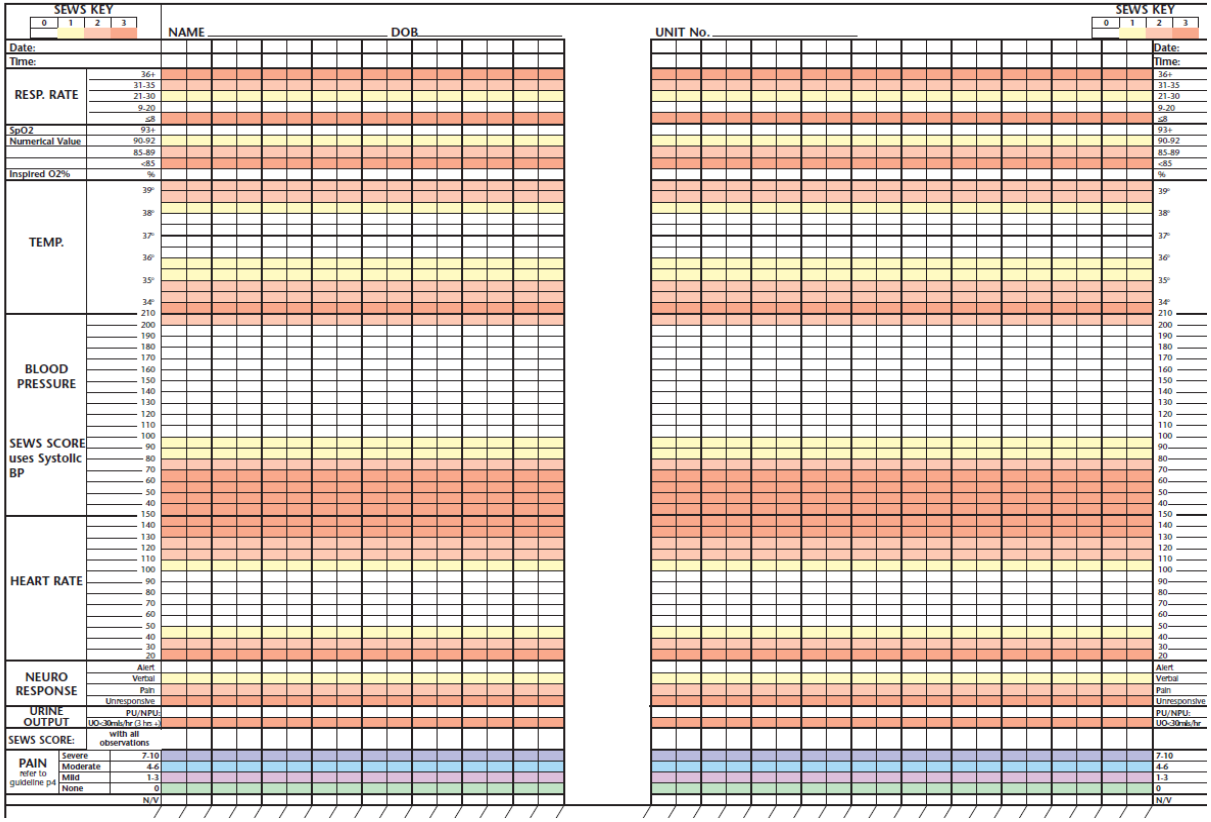
Appendix 1: Kaplan-Meier plot demonstrating the responsiveness differences between the blinded monitor (control group) and the unblinded monitor (test group)



The plot above includes patients who, when attached to the responsiveness monitor (within 12hrs of their ICU admission), were in the red zone (number 0-20, deep sedation). The y-axis shows the percentage of patients in the red zone when the monitoring initially started, the separation of the green and blue lines clearly demonstrates that the patients attached to a unblinded monitor (green line, test group) had fewer patients in the red zone (deeper sedation, RASS -4 or -5) as the 48 hour period (x-axis) progresses. It must be noted that the quantitative study this data were drawn from was a pilot study and was not sufficiently powered to show any statistically significant results. Nevertheless these results show an interesting trend towards the unblinded monitor assisting nurses to get patients out of the red zone

(deeper levels of sedation) quicker than those who did not have the responsiveness monitor trend visible.

Appendix 2: An example of an Early Warning Score (EWS) chart



Pain Assessment & Management Guidelines

How to score pain: 0 — No Pain … 10 — Worst Pain Imagineable

Pain Score:		Action:
0	NONE	Continue to assess pain with every set of observations (**must be** at least daily).
1-3	MILD	Assess. Using guidelines, prescribe/give analgesia as appropriate for the patient. Review.
4-6	MODERATE	Assess. Using guidelines, prescribe/give analgesia as appropriate for the patient. Review.
7-10	SEVERE	Assess. Using guidelines, prescribe/give analgesia as appropriate for the patient. Review.

Guidelines

Cancer-related pain: Always score the worst pain in the last 24hours or since last assessment.

FOR PERSISTANT MODERATE PAIN (4 OR ABOVE) WHICH DISTRESSES THE PATIENT:
Use Cancer Pain Management Algorithm in Palliative Care Resource File. This is distributed to all wards and is also accessible on the intranet. If no improvement in pain score contact hospital palliative care team on **page 1266** at SGH and **page 5742** at VI.
Out of hours advice can be obtained from the Prince and Princess of Wales Hospice on **0141 420 6785.**

Acute pain: Score current pain on movement e.g. deep breathing

PERSISTENT SEVERE PAIN (7 OR ABOVE), WHICH DISTRESSES THE PATIENT:
Use Acute Pain Manual - distributed to all Operating Theatres areas and Surgical wards throughout Division. Also accessible on Intranet (via anaesthetic department homepage)
If no improvement in pain score contact CNS Pain Management on **page 1186/1157** at SGH and **page 3404/3101** at VI. On Call anaesthetist **page 1658** at SGH and **3004** at VI.

Measuring Sedation

The SEWS system uses the AVPU scoring system for conscious level. AVPU is an acronym for Alert, Verbal Pain, Unresponsive. The AVPU system relates to the previous sedation scale as follows:

Sedation	Descriptor	AVPU
0	Awake	A
1	Asleep, roused by speech	V
2	Physical stimulation (eg shaking) required to waken	P
3	Not roused by speech or shaking	U

Measuring Nausea

Is now recorded as 0 for no nausea or vomiting, N for nausea and V for vomiting
For persistent nausea and/or vomiting see clinical handbook or acute pain manual.

NB: Review Treatment Plan

If Temp>38 blood cultures ☐ other cultures ☐ Start antibiotic therapy if indicated

If Systolic BP<100 Review monitoring (cardiac/oximetry/urine output/invasive BP etc)
IV Access
Review patient/drug kardex. Consider fluid challenge → Definitive Therapy

Consider:

Hypovolaemia	Cardiac	Obstructive	Distributive
Dehydration	*Arryhthmia*	*PE*	*Sepsis*
Blood loss	*Pump failure*	*Tamponade*	*Anaphylaxis*

If Pulse>130 Review monitoring
IV Access
Review patient/ECG/electrolytes → Definitive Therapy

If O_2 sats <93% Review probe ? accurate
Review patient → prescribe oxygen on kardex if indicated.

If RR>24 Review patient/CXR +/- gases/PEF etc → Definitive Therapy

If responds to pain only or unresponsive
If BM<4 Assess airway, BM GCS, consider neuro obs chart, review patient/kardex.
Check urgent blood glucose/IV dextrose or oral carbohydrate

SGH469

South Glasgow Hospitals
STANDARDISED EARLY WARNING SCORING SYSTEM (SEWS)
Patient Observation Chart

NHS Greater Glasgow and Clyde

Name
Address
AFFIX PATIENT ID
Hospital No.
DOB

	Date	Ward	Consultant
Admitted			
Transferred			
Transferred			
Transferred			

This is Chart Number_____during this admissio

All seven parameters must be assessed with each set of observations to obtain an accurate SEWS score.
If a patient has abnormal vital signs please pay particular attention to scoring for urine output.

How to calculate SEWS Score

- Note whether observation falls in shaded "At Risk Zone". Score as per SEWS Key.
- Add points scored and record total "Sews Score" in bottom row of chart.
- Respiratory rate — Write numerical value in appropriate box
- Saturation Sp02 — Write numerical value in appropriate box
- Inspired Oxygen — If the patient's saturation is recorded on air please write A in appropriate box. If patient is on oxygen therapy, please document the amount in appropriate box.
- Temperature — Write numerical value in appropriate box
- Blood pressure — Write numerical values for systolic and diastolic pressure in appropriate box. Remember only the systolic value is considered for the SEWS Score.
- Heart rate — Write numerical value in appropriate box
- Neuro Response — Record patient's best response. If the patient is asleep or demonstrates new confusion, award the same score as verbal response.
- Urine Output — Check that patient has voided urine recently. If yes write PU in box provided. If no write NPU in box provided.
- Urine Output — Check if the patient has passed the equivalent of or more than 30mls/hour for the last three consecutive hours. If yes score 0 in box provided. If no score 3 in box provided and add to total SEWS score.
- SEWS Score — Add up scores for all 7 parameters and write in box provided. If the patient merits an aggregate score of 0 please write 0 in the SEWS score box. Action as per guidelines below.

SEWS KEY

0	1	2	3

SEWS 0-1: Routine observations
SEWS 2-3: Hourly observations and inform nurse in charge
SEWS 4+: Contact PRHO immediately. SHO or more senior doctor must be informed by Junior Doctor. Please record action taken in Nursing Notes

FURTHER SEWS SCORE SHOULD BE CHECKEI

- In the event of a sudden worrying ***Change***
- If there is a worsening ***Trend***
- If concerned the patient looks ***Unwell***

The frequency of SEWS scoring is determined by the previous SEWS Score. If the patient continually scores 0-1, the nurse caring for the patient should determine frequency of observations.

A full set of observations and SEWS score should still be carried out.

If SEWS continually 0-1 frequency of observations:

Date												
Frequency												

For extra information such as wound, CSM etc. use slanted columns at bottom of page.

Appendix 3: Aide memoir

Interview topics

1. Intensive care nursing
2. Technology in nursing practice
3. Expectations of technology, including thoughts, feelings and perceptions
4. Good experiences or bad experiences of technology, including helpful or unhelpful
5. Changes in experiences as nursing career has progressed
6. Sedation, current practices
7. Influences on sedation practices, including environmental
8. Importance of 'optimal' sedation in everyday practice
9. Effects of poor sedation management, consequences for nurses and patient

Probing Interview Questions

1. What made you choose a career in ICU?
2. Do you have any thoughts, opinions, feelings about the technologies used in ICU? If so, can you tell me about them?
3. Do you feel prepared to use the technologies when they are introduced to nursing practice?
4. Do you have any views on the sedation of ICU patients? If so can you tell me about them?
5. Have you had any experiences surrounding sedation of an ICU patient you can remember and are able to share with me?
6. What are your thought and feelings regarding the responsiveness monitor you have been using today?
7. Has it affected your nursing practice today?
8. Can we focus on a couple of scenarios from your nurse log today, can you explain a little bit more about what happened at xx:xx and xx:xx?

Appendix 4: Example of nurse log

Date (dd/mm/yy)	**Time** (24hr clock hh:mm)		**RASS**	**Monitor traffic light colour** (R/Y/G)	**Monitor responsiveness index number**	**Nurse decision with monitor** A	D	**Reasons for disagreement with monitor**	**Signature**

Appendix 5: Published studies and guidelines relating to sedation practice in ICUs.

Each had differing recommendations of the frequency sedation assessments should be undertaken using clinical sedation scales.

Author, Publication & Year of publication	Title of Paper	Type of study	Recommended Sedation Score Frequency	Comments
Royal College of Anaesthetists (2001)	Implementing & ensuring Safe Sedation Practice for healthcare procedures in adults	Working Party Report	Nil	One team member should have responsibility for patient observation and record keeping
Bennett (2003)	Guidelines for sedation of the critically ill child	Practice review	Nil	A desired sedation score should be documented by medical staff
Brattebo et al (2002)	Effect of a scoring system and protocol for sedation on duration of patients' need for ventilator support in a surgical ICU	Observational study	Nil	Medical staff defined level of sedation twice a day and nurse in charge of pt was responsible for monitoring and adjusting sedation as per guidance
Intensive Care society (2007)	Sedation Guideline	Guideline	Nil	Sedation should be managed precisely and given priority attention
European Association for Palliative Care (2009)	Monitoring of sedation at end of life, supportive care for families	Literature review	Nil	Level of sedation should be assessed daily and reviewed in light of patient goals

American Association of Nurse Anaesthetists (2003)	Considerations for policy Guidelines for Registered Nurses Engaged in the Administration of Sedation and Analgesia	Guidelines	Nil	
Martin et al (2007)	Changes in sedation management in German ICUs between 2002 & 2006: national follow-up survey	Follow-up survey with descriptive & comparative cross-sectional multi-center design	Nil	There was an increased use in sedation scoring between the 2 years
Jacobi et al (2002)	Clinical practice guidelines for the sustained use of sedatives & analgesics in the critically ill adult	Discussion	Regular	A sedation goal endpoint should be established and regularly redefined for each patient. Regular assessment & response to therapy should be systematically documented
Pun et al (2005)	Large-scale implementation of sedation & delirium monitoring in the ICU: A report from two medical centers	Prospective observational cohort study	4 hourly (3 times per 12hr shift)	
Thomason et al (2005)	ICU delirium is an independent predictor of longer hospital stay: a prospective analysis of 261 non-ventilated patients	A prospective cohort	Once per 12 hour shift	This was the study recording not nursing recording

Masica et al (2007)	Clinical sedation scores as indicators of sedative and analgesics drug exposure in ICU patients	Prospective observational pilot study	Twice daily	
Adam, Rosser & Manji (2006)	Impact of introducing a sedation management guideline in ICU	Prospective observational study	Hourly	
Ely et al (2003)	Monitoring Sedation Status Over Time in ICU Patients	Prospective cohort study	Nil	Only a single RASS score per pt assessment was taken for study purposes
Olson, Thoyre & Auyong (2007)	Perspectives on sedation assessments in critical care	Summary of sedation scales	Nil	Frequent stimulation for sedation assessment would interfere with sleep and recovery
Watson & Kane-Gill (2004)	Sedation Assessment in Critically Ill Adults: 2001-2004 Update	Literature Review	Nil	Goal driven sedation therapy improves patient outcomes 7 there are several useful tools available to guide sedation therapy
Sessler et al (2002)	The Richmond Agitation-Sedation Scale: Validity & Reliability in Adult ICU Patients		Nil	
Elliott, McKinley & Aitken (2006)	Adoption of a sedation scoring system & sedation guideline in an ICU	Quasi-experimental pre intervention & post intervention quality improvement design	4 hourly documentation	

Appendix 6: Staff Information Sheet

STAFF INFORMATION SHEET

Version 1.1

11th December 2009

Study Title: A phenomenological exploration of clinical decision making in ICU nurses in relation to sedation management

You are invited to take part in a research study. Before you decide whether or not to take part, it is important you understand why the research is being done and what it will involve. Please read the following information carefully. If there is anything that is not clear please do not hesitate to contact me.

Background

The intensive care unit (ICU) environment is host to a large amount of technology. Technology's influence on the nursing profession has been subject to considerable review. Nevertheless, as you are aware, the ICU is a haven for a vast amount of technology; new and old - which you manage and interact with daily. Today you have received practical training on a new responsiveness monitor which is going to be tested in the ICU as part of a large study. Although it is very important that we find out if the new monitor can improve patient care and outcomes, it is just as important that it can be effectively integrated into nursing practice. As a former intensive care nurse, I believe that technology must help not hinder nursing practice and assist intensive care nurses in their clinical decisions for their patients' care.

Aims

As part of my PhD, I am conducting a study examining the clinical decision making of ICU nurses' in relation to the introduction of the new responsiveness monitor. I wish to gain an insight into the lived experiences of the 'world' of the ICU nurse from their perspective and examine the meanings given to their clinical observations that then guide the decisions made specifically in relation to the incorporation of the responsiveness monitor into their critical care nursing practice.

What it will involve for you?

If you decide to take part in this research study I will conduct a digitally recorded interview. This will take place at an appropriate time during your nursing span of duty when you have been or are using the new responsiveness monitor. You must have at least 12 hrs of responsiveness monitor experience before the interview can take place. The interviews will last for approximately 20- 45 minutes.

Do I have to take part?

Taking part is completely voluntary; you are not obliged to take part.

What will happen if I want to take part?

If you decide to take part in this research study, you will be asked to sign a consent form. The interview will be digitally recorded and then transcribed (written up). All written

information gathered will be kept confidential; you will be allocated a code to ensure you remain anonymous. The interview data and quotes from your interview will be used in my PhD thesis and/or in articles published in journals - once again all the data will be anonymously coded. Both the digital data and written data gathered will be stored securely on password protected computers in a locked room and may be kept for up to 5 years or until data analysis is deemed complete.

The ICU senior staff members are aware of the study and are supportive for it to go ahead. You are free to withdraw from the study at any time, without giving any reason. If you believe that your time in providing patient care is being affected or the patient you are looking after is being disturbed, (as the interview will take place at bedside) you are free to stop the interview at any time.

Will I find out the results of the study?

It is hoped that the results of this study will provide information to assist with the further development of the responsiveness monitor and the integration of other ICU technology's in the future.

If you are interested in taking part in the study please contact me in person, by telephone or by email (details below).

I have already obtained ethical approval from the Ethics Committee and Edinburgh University to carry out this study. If you have any problems with this study, or have any questions or queries relating to it, please do not hesitate to contact me or my academic supervisor:

Contact Details:	Alternative Contact Details:
Kirsty Everingham	Tonks Fawcett
PhD Student in Nursing Studies	Senior Lecturer
School of Health in Social Science	School of Health in Social Science
Medical School	Medical School
Teviot Place	Teviot Place

Appendix 7: Staff Consent Form

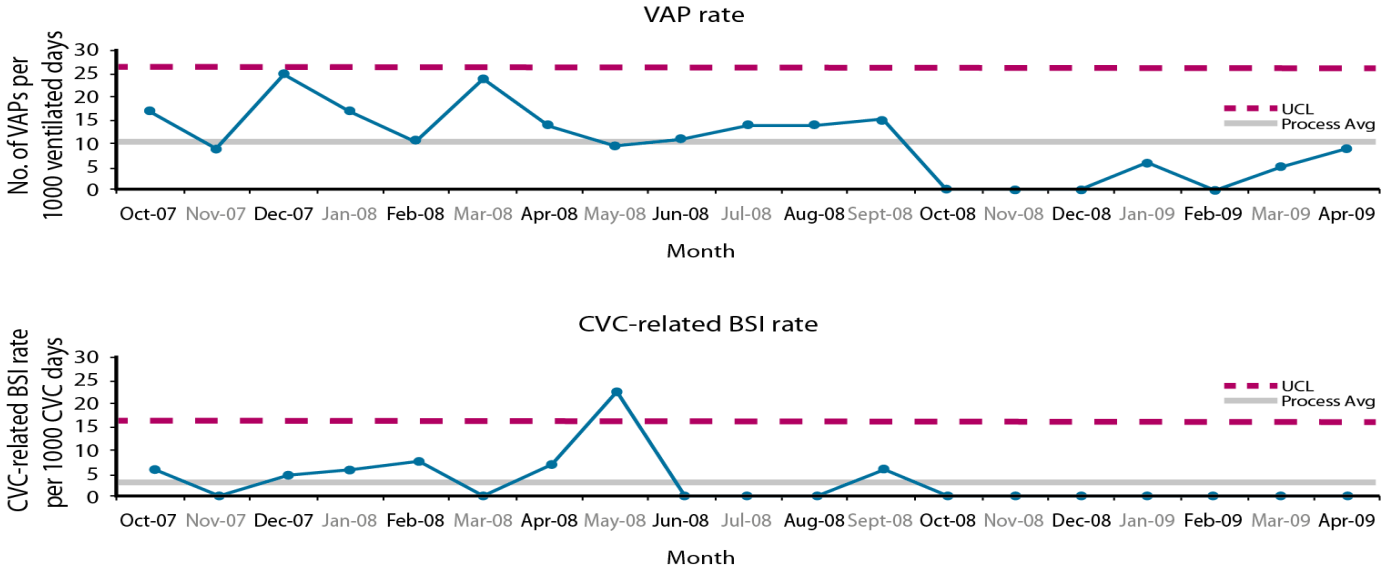
STAFF CONSENT FORM

Study Title: **A phenomenological exploration of clinical decision making in ICU nurses in relation to sedation management.**

Consent to be interviewed	**Initials**
1. I confirm that I have read and understand the staff information sheet dated 11th December 2009 (version 1.1) for the above study and have had the opportunity to ask questions.	☐
2. I understand that my participation is voluntary and that I am free to withdraw from the study at anytime without giving any reason.	☐
3. I understand that all notes and recordings taken during the interview will be treated confidentially and will be anonymised.	☐
4. I agree to my interview being digitally recorded.	☐
5. I understand that direct quotes from my interview may be used in the researcher's thesis and future publications but will be anonymised.	☐
6. I understand that the data collected may be kept for 5 years or until data analysis is deemed complete, wherein it will then be destroyed.	☐
7. I agree to participate in the study	☐

Name (PRINT)	Date	Signature
Researcher Name (PRINT)	Date	Signature

Appendix 8: Example of statistical process charts (SPC) (control charts) used in current practice to demonstrate rates of infections in 'real time' in ICUs



(Taken from Peden & Rooney (2009))

Control Charts are dynamic displays of process variation over time. They have upper (ULC) and lower control limits (LCL) which basically define the boundaries of the variation around the mean. The examples show a reduction in ventilator associated pneumonia (VAP) rates (top control chart) and central line (CVC) associated blood stream infection rates (BSI) after implantation of care 'bundles'

Appendix 9: Summary details of the Randomised Control Trial – IMPROVE study

IMPROVE pilot study - A Randomised Controlled Trial of Intensive Care Management of Sedation using Patient Responsiveness in Critical Care

Aims:

1. To test the protocol in the clinical setting
2. To determine recruitment rates to the study
3. To assess adverse event rates in the intervention group compared with usual practice
4. To undertake a qualitative evaluation of the acceptability of the intervention protocol

Primary objective

To evaluate whether decision-making based on responsiveness can decrease the proportion of time patients spend with low responsiveness values during the first 48 hours of ICU.

Secondary objectives

1. Does monitoring the sedation state of mechanically ventilated critically ill patients with the responsiveness monitor *reduces the duration of coma* compared with usual sedation practice?
2. Does monitoring the sedation state of mechanically ventilated critically ill patients with the responsiveness monitor *reduces the duration of mechanical ventilation* compared with usual sedation practice?
3. Is monitoring the sedation state of mechanically ventilated critically ill patients with the responsiveness monitor is *associated with excess adverse* events compared with usual sedation?
4. To undertake a *qualitative evaluation of nurse decision-making* in relation to responsiveness monitoring

Inclusion Criteria	Exclusion Criteria
1. Patient mechanically ventilated via an endotracheal tube 2. Patient receiving intravenous sedation with a hypnotic agent (midazolam or other benzodiazepine) or propofol by continuous infusion.	1. Primary intracerebral disorder (includes cardiac arrest with probable hypoxic brain injury; intracranial haemorrhage; head injury causing reduced conscious level prior to intubation) 2. Patient who is already awake at the time of enrolment defined as RASS $\geq$ -1 3. Age <16 depending on local guidelines and ethical committees 4. Patient not expected to survive the next

	24 hours 5. Patient receiving long term ventilation prior to ICU admission 6. Patient with a long term tracheostomy prior to ICU admission 7. Patient transferred sedated and mechanically ventilated from another ICU unless recruitment is possible within 24 hours of first ICU admission 8. Patient receiving continuous neuromuscular blocking agent at the time of screening for enrolment. 9. Previously enrolled in the trial during a separate ICU admission during this hospital stay. 10. Status epilepticus 11. Confirmed meningitis or encephalitis at the time of screening for enrolment 12. Chronic neurological disease interfering with normal neuromuscular function, e.g. motor neurone disease, Guillain-Barre syndrome or inherited neuromyopathies

Intervention group: continuous responsiveness monitoring

The responsiveness monitor will be attached to the patient and data presented to the clinical staff continuously. All nursing staff caring for patients in the study will receive training in the study protocol and the use of the monitor prior to commencing the trial. The monitor will:

[a] Present a continuous trend over time that will be colour coded using a traffic light system.

[b] A responsiveness number will also be recorded representing the most recent responsiveness value, colour coded appropriately, in a separate window.

[c] An information/instruction box will be presented continuously to staff based on the current responsiveness value.

Criteria to discontinue responsiveness monitoring

Monitoring will be discontinued when one of the following occurs:

1. 48 hours have elapsed from ICU admission.
2. The patient is extubated.
3. The patient dies or a decision is made to withdraw treatment. In these cases the computer and monitoring equipment should be removed and an end-of-study entry made in the CRF.

Criteria to re-start responsiveness monitoring

Responsiveness monitoring will be re-attached and re-started if the patient requires re-intubation and sedation within the 48 hours intervention period. Responsiveness monitoring will continue during temporary sedation stops that are part of the care procedure.

Duration of assessing RASS score

Hourly RASS scoring will continue throughout the 48 hours period unless:

1. The patient dies or a decision to withdraw treatment is made
2. The patient is discharged from ICU (In these cases RASS will be assumed to be 0 or > confirmed by patient visits)

Duration of intervention

The intervention will continue for up to 48 hours.

One of the following will be recorded as the reason for completing the intervention:

1. Patient is successfully extubated (monitoring will be re-instituted for patients re-intubated during 48 hours from first randomisation)
2. Patient dies in ICU prior to extubation within 48 hours
3. Patient having active treatment withdrawn prior to extubation within 48 hours
4. Patient transferred to another ICU before extubation within 48 hours
5. Relative consent declined

Control group: Usual practice including daily sedation group

Minimum standards for control patients for centres participating in the trial

There are no universally accepted standards for best sedation practice for ICUs. Based on review of current recommendations from national societies and guidelines (see earlier), current best practice for the control group will be defined as:

1. Use of a clinical sedation scoring system
2. A sedation protocol that links a clinical scoring system to suggested sedation management
3. Consideration of daily sedation holds/breaks

The frequency of performing and recording clinical sedation scores for the control group and intervention groups will be determined by local practice. It will not be modified for the purpose of the study.

Data capture in the control group

Data for responsiveness will be captured in a manner identical to the intervention group including the responsiveness monitor. However, all data will be blinded to the study staff and no instruction boxes will appear. A bedside computer will capture responsiveness data for all patients to enable comparison with the intervention group. Criteria to remove or re-attach the monitor will be identical to the intervention group.

Primary outcome measures

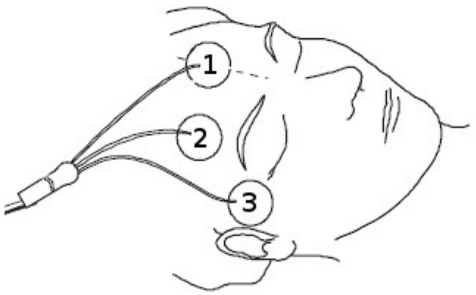
1. Recruitment rate (proportion of eligible patients)
2. Proportion of time spent with low responsiveness (red colour) during the first 48 hours in ICU
3. Proportion of time spent with RASS score -4/-5 during first 48 hours.
4. Expected adverse event rates (comparison of control and intervention groups during intervention period)

Secondary outcome measures

1. Duration of mechanical ventilation
2. ICU, hospital mortality
3. Total sedative drug dose during first 48 hours in the ICU
4. Total dose of sedative drug during ICU stay (up to 7 days follow up)
5. Mean sedation drug use per day of mechanical ventilation (up to 7 days follow up)
6. Total opioid drug dose during first 48 hours in the ICU
7. Total opioid drug dose during ICU stay (up to 7 days follow up)
8. Mean opioid drug use per day of mechanical ventilation (up to 7 days follow up)

Appendix 10: Examples of electrode placement, explanation of responsiveness measurement and examples of the responsiveness monitor set up and interface.

Electrode placement

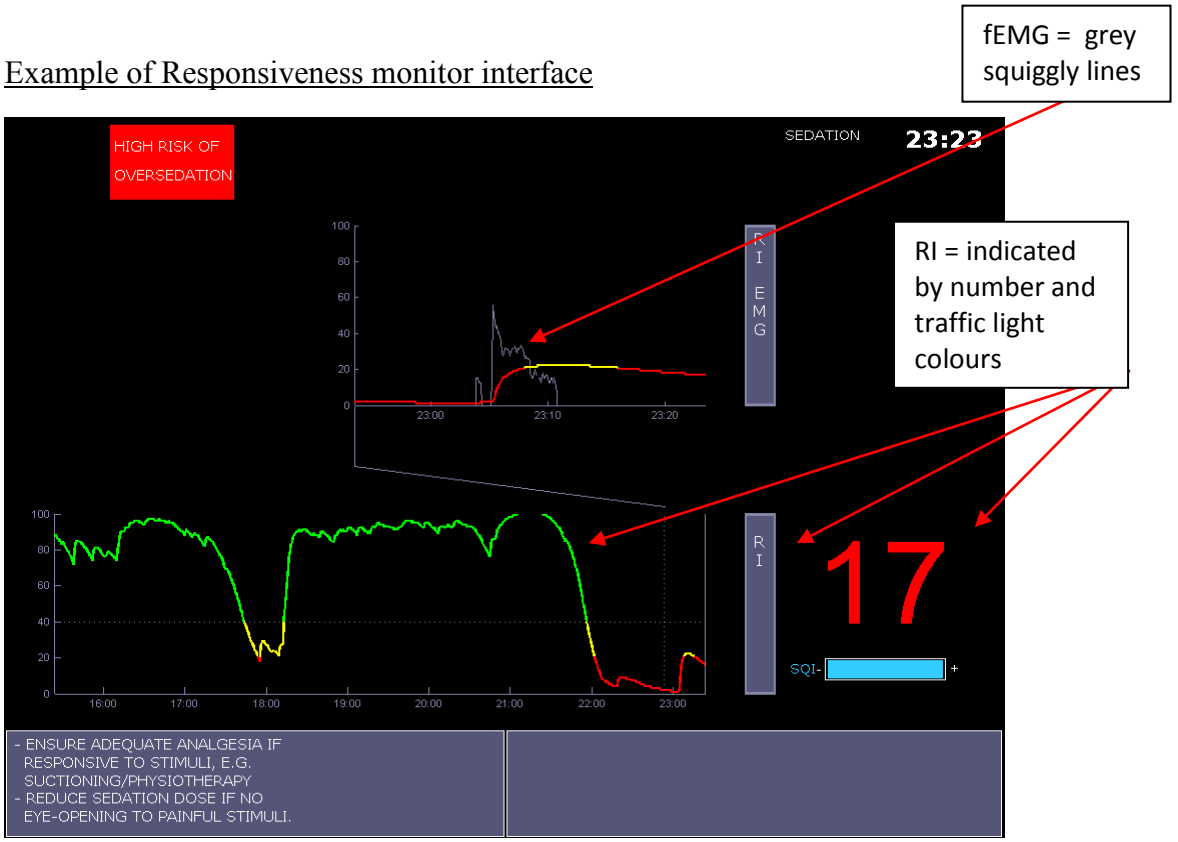


Responsiveness Measurement

- Measurement is based on the frontal muscle activity (facial electromyelogram, fEMG)
- Sedated patients' reactions to various stimuli (pain, noise, care procedures) are displayed as rises in the EMG activity
- Responsiveness Index (RI) quantifies the amount of rises in the EMG power in the previous 60 minutes
  - RI = 100 indicates full responsiveness of the patient
  - RI = 0 indicates no responsiveness
- Both EMG and RI are shown in the monitor screen
  - EMG rises immediately when the patient responses to stimuli and decreases when the patient is calm
  - RI increases and decreases more slowly
  - RI indicates the state of the patient on a longer time scale
  - EMG indicates the momentary activity of the patient

Responsiveness monitor set-up

Example of Responsiveness monitor interface



The interface was a continuously moving screen reflecting patients' responsiveness level

Appendix 11: Summary of Oral and Poster presentations of doctoral work undertaken by researcher

Poster presentations (Poster example on p324)

October 2011 – 36th Australian and New Zealand Annual Scientific Meeting on Intensive Care (ANZIC), Brisbane

December 2011 – The State of the Art Meeting, Intensive Care Society (ICS), London

Oral presentations

November 2011 – Lecture for the Clinical Decision Making Module, MSc Nursing Students, University of Edinburgh

November 2011 – Invited Speaker, 20th Update in Critical Care for Physiotherapists, University College London, London

December 2011 – The state of the Art Meeting, Intensive Care Society (ICS), London

Lifting the veil off sedation: towards a more wakeful Intensive Care Unit (ICU)

Kirsty Everingham[1], Tim Walsh[2], Tonks Fawcett[3]

[1]PhD Student, University of Edinburgh & Research Coordinator in Critical Care, Royal Infirmary of Edinburgh
[2]Professor of Critical Care, Clinical and Surgical Sciences, University of Edinburgh
[3]Senior Lecturer, Nursing Studies, University of Edinburgh

"I just think that people waking up is one of the hardest things we have to witness here, because people are uncomfortable, they get a fright. You know it is quite nerve racking sometimes because you don't know what is going to happen…"

(Interviewee 004)

Background

Current research evidence supports an association between less sedation and better patient outcomes following critical illness[1]. In our ICU, compliance with sedation holds as part of the Scottish Patient Safety Programme[2] is seen as poor, failing to meet national targets. Sedation management is predominantly a nurse-led activity using a wide variety of, and often potentially subjective, sedation scoring tools to assess patients' sedation status.

In collaboration with the Edinburgh Critical Care Research Group, GE Healthcare has developed a sedation monitoring device, the responsiveness monitor, based on responsiveness of the facial electromyography (EMG). EMG is measured through the placement of electrodes on the patient's forehead. The electrodes are sensitive to muscle activity, the EMG indicating responses to external stimuli[3]. The device generates a responsiveness score and trend based on over the previous 60 minutes (Figure 1). It is hoped that with the addition of the responsiveness monitor to current sedation management, that patients will spend less time deeply sedated (RASS -4/-5)[4], less time ventilated and that this device will assist nurses in their clinical decision making in relation to sedation and the safety and comfort of their patients.

Few studies have specifically explored critical care nurses' experiences and feelings surrounding sedation management, the clinical decisions they make and their impact on patient outcomes.

Figure 1: Responsiveness monitoring interface and electrode positioning

Aim

We aimed to provide insight into the world of the critical care nurses, specifically their perceptions and experiences of sedation management and decisions by exploring the environmental and experiential influences on their care decisions. Particular to this exploration was the issue of sedation holds and the presence of new, objective, sedation technology, the responsiveness monitor, within their critical care practice.

Method

Sixteen qualitative interviews were completed employing a phenomenological approach to enquiry. ICU nurses of varying ages, gender and nursing experience were interviewed at the bedside, thereby maintaining context. Taped interviews, supported by field notes to capture non-verbal data, were transcribed and analysed. Using an interpretive analysis, commonality of themes and meanings were exposed and the contextual implications of the findings explored.

Findings

Themes emerging from the data demonstrated specific influences on the lived experience of the critical care nurses that militated against optimal sedation decisions, thereby affecting patient outcomes.

Table 1: Emerging themes and quotes illustrating the ICU nurses 'experience' of a more wakeful population

Theme	Sub Themes	Illustrative quotations
Working priorities	• Organisational constraints • Safety and comfort	On more wakeful patients *"...It is a difficult one because we know it is better for the patient but it makes our job more difficult I think... when patients are awake they are more likely……. more prone to reaching for their tubes. You've got to watch them more; there are less staff; you're covering people all the time..." (005)* *"It's more difficult because it just makes it so. It's more stressful for yourself and you can't do your things, because you need to go and attend to the patient, make sure they're safe and.."(014)* *"....there are certain aspects of nursing care that I always want to be able to. There are lots of things, talking to relatives, spending more time with the patient and what not, but we just can't do that in the same way anymore" (008)*
Decisions as obligations	• Peer pressure • Professional conflict	*"I feel obligated to do a sedation hold even if sometimes I don't feel quite* (pause)*…. I don't feel that it's a good thing to do, … because of safety…" (004)*
Mutual misunderstanding	• Conflicting perceptions • Resentment	*"I think sometimes they think that we put sedation up or down because they think we just want an easy life, but they forget that we're here to do a job. We're wanting, the same aim as them…" (007)* *"...if the Consultant wants to come along and switch the sedation off and stand there for whatever, half an hour, an hour or two hours until it all wears off, then that's fine, they can do that, but they won't…" (009)*
Loss of Autonomy	• Feelings of detachment • Loss of control	*"Well it just seems that people* [doctors] *are pushing sedation holds on all, everybody.....They come round and …will put your sedation down, or put it off, and then you've got the aftermath of trying to get that patient to breathe again properly and get the ventilation back under control."(006)* *"It can also be a frustrating ….. if there's been a medical decision to have a patient more awake and, but there is no kind of* (pause)*….. so the medical decision is stop all sedation and we will see what happens and then the medical staff aren't around and there are no options for re-sedating. It's a very frustrating thing to have an agitated, uncomfortable patient … just because the doctors decided… let's wake them up …"* (010)

Decisions and Fear	• Agitation
	• Adverse events
	  ◦ Guilt
	  ◦ Blame
	  ◦ Failure
	• Apprehension
		"…You're wary of it because you know you're turning sedation off, whereas I would be more used to weaning it slower, whereas now you're kind of… you know, on 10 of Propofol and turn it off, and you're wary of how that patient is going to wake up." (016)
		"…it is difficult to know how your patient is going to react if they've been on a load of sedation and you know they are as 'flat as a pancake' and then suddenly you switch it all off and you don't know how they are going to cope…" (009)
		"…Often you feel like you could have avoided it …. you just take your eyes off the patient one minute and it's [the ET tube] *gone, so you do feel a bit guilty. You do feel a bit like it's my fault…"(005)*
		On inadvertent extubation…*"I would feel a failure personally but that's because I am used to the days when you were there all the time. You didn't turn your back on the patient, you didn't leave the patient…" (008)*
		"…You're there, you're in charge of them for 12 hours, I mean …you have to make sure it's a safe environment for them" (016)

Responsiveness Monitor

Against the above findings, the nurses felt that the responsiveness monitor could be a positive influence on their sedation decision making, offering them the reassurance, confidence that was perceived as missing and preparing them more effectively for the care and benefits of the more wakeful patients. Quotes to illustrate these positive influences are shown in Table 2. However such findings necessarily merit further practice based research.

Table 2: Illustrative quotes of the positive influence of the responsiveness monitor

Illustrative Quotes
"I think it is very helpful because …in the red zone like this [the deeply sedated zone], if the patient is lying in the red zone for no apparent reason, then it kind of concentrates your care that something has to be done..." (002)
"I think it is much more of a reminder… you don't necessarily do your RASS every single hour of your observations, yet I look at the monitor, I have been seeing the trace on the monitor a lot more than I would actually have done the RASS" (001)
"It's a guide...it gives you a bit more confidence in what you're doing in terms of lightening the patient and maybe giving them more sedation, it might kind of help you decide what to do I think…It kind of confirmed what I was thinking so I felt more comfortable then in reducing it a bit" (005)

Implications

Despite the evidence demonstrating that less sedation equates to better patient outcomes, and although nurses are ideally placed to drive a change of practice, there are clear identified interpersonal and environment barriers currently in the delivery of optimal sedation care. The nurses are responsible for many extended roles in ICU, yet appear to have a turbulent relationship with sedation decisions. The perceived lack of team management and optimal inter-professional communication leaves the nurses feeling a loss of professional knowledge and autonomy such that they feel their decision making skills are undermined. This has led to nurses experiencing only negative consequences as a result of sedation holds, which in turn generates resentment and detachment from the initiating of sedation holds. Such feelings must necessarily affect patient outcomes.

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Work funded by GE Healthcare

Appendix 12: Scotland A Ethical Approval and Clarification Letters

Scotland A Research Ethics Committee

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NHS SCOTLAND

Miss Kirsty Everingham
Room GU309
Chancellors Building
Royal Infirmary of Edinburgh
Edinburgh
EH16 4SB

Date: 1 December 2009
Your Ref.:
Our Ref.: 09/MRE00/87

Enquiries to: Walter Hunter
Extension: 89026
Direct Line: 0131 536 9026
Email: walter.hunter@lhb.scot.nhs.uk

Dear Miss Everingham

Study title: **A phenomenological exploration of clinical decision making in Intensive Care Unit (ICU) nurses in relation to sedation management.**

REC reference: **09/MRE00/87**

The Scotland A Research Ethics Committee reviewed the above application at the meeting held on 26 November 2009.

Documents reviewed

The documents reviewed at the meeting were:

Document	Version	Date
Covering Letter		11 November 2009
REC application		11 November 2009
Protocol	1.0	06 November 2009
Investigator CV: Ms T N Fawcett		01 October 2009
Investigator CV: Ms K Everingham		11 November 2009
Participant Information Sheet: Staff	1.0	07 November 2009
Participant Consent Form: Staff	1.0	07 November 2009
Interview Schedules/Topic Guides	1.0	06 November 2009

Provisional opinion

The Committee noted that this study was linked to the IMPROVE study, which the Committee had approved earlier this year. However this study was an educational study looking at ICU nurses

decision making. The Committee had no major ethical concerns with the study other than it could have been more concise in presentation and used less 'academia' language. They noted that interviews would be conducted at the bedside but precautions had been built in to ensure there was nurse cover at all times. However it was not clear why the interviews had to be conducted at the bedside. The Committee considered that relatives should not be at the bedside when the interview was taking place. The Committee noted the study was being commercially funded with data collected being shared with the funder. The intention also was to store the data on a home computer. The Committee wanted an assurance that the personal data would be anonymised and securely stored. The Committee wondered if there was the potential for bias given the sponsorship of the study by the manufacturer and the researcher having been involved in the nurses' initial training in the use of the monitor. The Committee noted there was no mention of the 12 hour criteria in the information sheet.

The Committee would be content to give a favourable ethical opinion of the research, subject to receiving a complete response to the request for further information set out below.

Authority to consider your response and to confirm the Committee's final opinion has been delegated to the Chairman together with Canon M McManus.

Further information or clarification required

1. Justify why the interviews should be held at the bedside; and if it was necessary for bedside interviews ensure they do not take place in front of relatives.
2. Justify funding from a commercial company for a PhD study and sharing with them the information collected.
3. Clarify the potential for bias given the involvement of the funder and your role in training the nurses in the use of the monitor.
4. Give an assurance about the security of the information collected and stored on a home computer.
5. Mention in the information sheet the 12 hour criteria experience.

When submitting your response to the Committee, please send revised documentation where appropriate underlining or otherwise highlighting the changes you have made and giving revised version numbers and dates.

If the Committee has asked for clarification or changes to any answers given in the application form, please do not submit a revised copy of the application form; these can be addressed in a covering letter to the REC.

NHS SCOTLAND

The Committee will confirm the final ethical opinion within a maximum of 60 days from the date of initial receipt of the application, excluding the time taken by you to respond fully to the above points. A response should be submitted by no later than 31 March 2010.

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

REC reference number: 09/MRE00/87-Please quote this number on all correspondence

Yours sincerely

Dr Malcolm Booth
Committee Vice Chairman
cc: Daniel Jackson
GE Healthcare
Pollards Wood
Nightingales Lane
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University Hospitals Division

NHS Lothian

Kirsty Everingham
PhD student/Research
Coordinator
Room GU309
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11th December 2009

Mr Walter Hunter
Scotland A REC
Deaconess House
148 Pleasance
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EH8 9RS

REC Application: 09/MRE00/87
Short Title: ***Clinical Decision Making of Nurses in ICU***

Dear Mr Hunter,

Following review of the above application a number of points requiring further information or clarification were highlighted. I have addressed each of these in turn and enclosed the relevant documents with new version numbers and dates as required. The following have been addressed:

1. Justify why the interviews should be held at the bedside; if it was necessary for bedside interviews ensure they do not take place in front of relatives.
Bedside interviews will enable the nurse to remain in the environment in which is contextual and that he/she is comfortable. It is where the monitors are being used and will aid recollection and be more beneficial when referring to technical/physical aspects of the monitoring system (page 14, protocol v1.1). Following discussion with my supervisors it has been decided that if a relative is present at the time of a scheduled interview that the interview will be postponed (page 11, protocol v1.1).

2. Justify funding from a commercial company for a PhD study and sharing with them the information collected.
The sponsor (GE Healthcare) have funded the RCT (09/MRE00/17) that this qualitative work is linked too. They were keen to investigate how the monitor was integrated into practice by nurses (the main user group) so that following the results of the RCT they could make changes if necessary to the monitor to make it more user friendly and fit real life nursing practice. As I am coordinating the RCT in the ICU, I am embedded in the ICU already and well placed to speak with the nursing staff. The information sought is required by the sponsor to make necessary changes, if any.

3. Clarify the potential bias given the involvement of the funder and your role in training the nurses in the use of the monitor.
Please see response above. Additionally, as the researcher has no financial interests (is not a share holder) in the sponsors company she will not receive any financial benefits if the monitor is successfully marketed following positive RCT results. Please find enclosed a copy of the GE format investigation plan, it states in the publication policy (section 16, page 9) that the results of the qualitative work are planned to be published even though the RCT pilot may not have adequate power.

4. Given an assurance the security of information collected and stored on a home computer.
As with university computer access, the researcher's home computer will be password protected and encrypted memory sticks will be used to transport data from university to home when necessary. Files saved will not contain any identifiable data and names will be changed to codes when saving digital data files.

5. Mention in the information sheet the 12 hour criteria experience
This is already stated on the current version of the information sheet, bottom of page 1 (version 1.0, 7th November 2009) – I have highlighted in the enclosed copy.

Please do not hesitate to contact me with any further queries you may have.

Thank you for considering my application.

Yours sincerely

Kirsty Everingham
PhD student/Research Coordinator

Scotland A Research Ethics Committee

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NHS SCOTLAND

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Date: 17 December 2009
Your Ref.:
Our Ref.: 09/MRE00/87

Enquiries to: Walter Hunter
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Direct Line: 0131 536 9026
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Dear Miss Everingham

Study title: **A phenomenological exploration of clinical decision making in Intensive Care Unit (ICU) nurses in relation to sedation management.**

REC reference: **09/MRE00/87**

Thank you for your letter of 11 December 2009, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information was considered in correspondence by a sub-committee of the Scotland A REC. A list of the sub-committee members is attached.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk. Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

Notice of no objection must be obtained from the Medicines and Healthcare products Regulatory Agency (MHRA).

The sponsor is asked to provide the Committee with a copy of the notice from the MHRA, either confirming no objection or giving grounds for objection, as soon as this is available.

The Committee specified the following condition, which should be undertaken:

- The revised staff information sheet did not have an updated version number and date. You will see from the approved list of documents below that the identifier is version 1.1 dated 11 December 2009. This should be used on the document given to potential staff participants.

The Committee would be grateful for a copy of the final documents for their information.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Covering Letter		11 November 2009
REC application		11 November 2009
Protocol	1.1	11 December 2009

Investigator CV: Ms T N Fawcett		01 October 2009
Investigator CV: Ms K Everingham		11 November 2009
Participant Information Sheet: Staff	1.1	11 December 2009
Participant Consent Form: Staff	1.0	07 November 2009
Interview Schedules/Topic Guides	1.0	06 November 2009
GE Investigation Plan		25 November 2009
Response to Request for Further Information		11 December 2009

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

NHS SCOTLAND

REC reference number: 09/MRE00/87-Please quote this number on all correspondence

Yours sincerely

Professor Kennedy Lees
Chairman
cc: Daniel Jackson
GE Healthcare
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Appendix 13: GE Healthcare Study Plan page alluding to future publication of doctoral study

GE Healthcare

16 Publication policy

As mentioned in the protocol DOC0676177, the Research Nurse is going to undertake a qualitative evaluation of nurse decision-making in relation to responsiveness monitoring, and the results of this part of the study are planned to be published.

Considering the other outcomes, the study is a pilot study and the number of patients is possibly not sufficient to give conclusive evidence on the outcome variables. However, if some scientifically or clinically interesting findings are obtained from the preliminary outcome variables or retrospective analysis of the data, the Clinical Investigator and the sponsor are willing to collaborate publishing the findings.

17 Clinical investigation plan approval

Before this clinical investigation can start:

- The Clinical Investigator and the Representative of the Sponsor must approve this test plan in writing.
- This test plan (including the approved device risk analysis file) must been reviewed internally at GEHC, and the review must approved this test plan. This test plan was reviewed and approved internally at GEHC (DOC0680140) on 2009-11-03.
- The program has sent an application to the Ethical Review Board, and The Scotland A Research Ethics Committee has given a favourable ethical opinion for the study (DOC0677365).

18 Amendments

All potential amendments will be agreed and recorded between the Sponsor and the Clinical Investigators. Updates will be sent to the ethical review board per ethical review board requirements.

19 Other

GEHC will provide compensation per the agreement between the site and GEHC (Clinical Investigator Agreement – IMPROVE study, 19th December 2008, and Minute of Variation to Investigation Agreement – IMPROVE Study, dated 29/06/2009). Insurance matters are also stipulated in the agreement between the site and GEHC.

When the test reaches completion, GEHC will arrange to have the entire test set-up returned to GEHC.

The device subject to this investigation does not incorporate human blood derivatives or tissues of animal origin.

During the test, observers from GEHC may visit the test site to follow the test process. These visits are agreed upon and arranged by the Monitor and the Clinical investigator on a case-by-case basis.

During the test, interim results may be analysed by the Clinical Investigator, the Program Managers, the Monitor, and the Research Nurse. Findings may cause a change in the testing schedule or stopping of the test.

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